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Rogachev (V. L.). Желтизна, или увядание ранней Капусты на юге Украины. [Yellowing or wilt of early Cabbages in the Southern Ukraine.]—Защ. Раст., Москва [*Zashch. Rast. Moscow*], **4**, 3, p. 54–55, 1 fig., 1959.

This disease, caused by *Fusarium conglutinans* [map 54], was observed in 1958 in the Kamȳshev, Vasil'ev and B.-Belozersk areas of the Zaporozh'ye region, where massive infection occurred. This is the first occurrence in this region. In places up to 54% of infected plants were lost.

Schmidt (H.). **Der Massenwechsel der Vektoren der virosen Rübenvergilbung in den Jahren 1954 bis 1957 in Aschersleben.** [Population fluctuation of the vectors of Beet yellows virus during the years 1954–1957 in Aschersleben.]—*NachrBl. dtsch. PflSchDienst, Berl.*, **12**, 11, pp. 209–217, 12 graphs, 1958. [Russ. and Engl. summ.]

In studies at the Institut für Phytopathologie, Aschersleben, Germany, on the infestation of sugar beet by *Doralis* [*Aphis*] *fabae* [**37**, 385] and *Myzus persicae* [**38**, 46] both were found to be equally important as vectors of beet yellows virus in the area. Spraying with cebetox and wofatox increased sugar content [**38**, 637] by controlling severe infestation by *A. fabae* and reducing sucking injury [**37**, 257].

Schmelzer (K.). **Zur Kenntnis des Wirtspflanzenkreises des Rübenmosaik-Virus (Marmor betae Holmes).** [On the host plant range of Beet mosaic virus.]—*Zbl. Bakt.*, Abt. 2, **112**, pp. 12–33, 5 fig., 1959.

At the Institut für Phytopathologie, Aschersleben, *Stellaria media* [**38**, 503] was found suitable as a source plant in host range studies, mechanical inoculation with its sap being possible on plants susceptible to the inhibitory substances present in beet sap. Of 316 spp. (46 families) tested (and listed), 60 were systemically and a further 46 locally infected, 26 dicotyledon families being represented. Next to the Chenopodiaceae, the most susceptible was the Hydrophyllaceae; many spp. of Papaveraceae, Caryophyllaceae, and Leguminosae were also infected. In the Leguminosae infection usually caused shrivelling of the shoot tips, which was frequently followed by death of the plant.

Nikolić (V.), Čamprag (D.), & Matić (I.). **Ispitivanje štetnosti mozaika na industriskoj Šećernoj Repi.** [Study of damage by mosaic in industrial Sugar Beet.]—*Zasht. Bilja (Plant Prot., Beograd), 1958*, 46, pp. 69–73, 1958. [Engl. summ. Received Aug. 1959.]

Field tests by the Sugar beet Selection Inst. Crvenka, Vojvodina, Yugoslavia, in 1954–56 showed that beet mosaic virus [cf. **36**, 565] caused most damage when infection occurred at an early stage. Infection reduced the root yield by an av. of 5%, leaf yield 6·4%, and sugar 12%. The spread of the disease is considered alarming in some regions.

Meier (W.). **Ergebnisse der Sortenprüfung bei Zuckerrüben 1956–1958.** [Results of Sugar Beet variety tests 1956–1958.]—*Mitt. schweiz. Landw.*, **7**, 3, pp. 33–36, 1959.

In trials at the Eidg. Landwirtschaftlichen Versuchsanstalten at Lausanne, Liebefeld-Bern, and Zürich-Oerlikon the var. Cercopoly was rated highly resistant to leaf spot (*Cercospora* [*beticola*: **37**, 566]), while Maribo P, Kleinwanzleben Polybeta, and Janaz AJ3 exhibited slight to av. resistance.

Stevanović (R.). **Ispitivanje efikasnosti raznih fungicida u suzbijanju pegavosti lišća Šećerne Repe.** [Investigations of the effectiveness of different fungicides for the control of leaf spot of Sugar Beet.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1958*, 46, pp. 51–57, 1958. [Engl. summ. Received Aug. 1959.]

At the Sugar beet Selection Sta., Aleksinac, Yugoslavia, of 11 fungicides tested in the field against *Cercospora beticola* [**36**, 443] on the local var. Aleksinac N, lirocuprox, a Dutch product, at 5 l./ha. gave the best control, increasing sugar yield by 35·3% over the untreated. Also effective were colloidal copper at 11 kg, Bordeaux mixture (12), copper-Sandoz-special (6), copper-lime (12), and kuprin (14), with increases of 33·6, 33·2, 29·6, 25·4, and 24·5%, respectively. All except Bordeaux are recommended for local use.

Buxton (E. W.), Perry (D. A.), Doling (D. A.), & Reynolds (J. D.). **The resistance of Pea varieties to Fusarium wilt.**—*Plant Path.*, **8**, 2, pp. 39–45, 2 fig., 1 graph, 1959.

The results of these tests on land in Essex and near Peterborough infested by *F. oxysporum* f. *pisi* have been noted [**38**, 652]; 77 out of 146 vars. now known in Britain are resistant. Physiologic races 1 and 3 were prevalent, but not 2. Testing for resistance in the glasshouse gave inaccurate indications of field performance unless soil from infested fields was used. These results provide a basis from which stocks of wilt-resistant peas can be raised by selecting segregating plants from primarily susceptible stocks or by breeding new lines.

Bywater (Joan). **Infection of Peas by Fusarium solani var. martii forma 2 and the spread of the pathogen.**—*Trans. Brit. mycol. Soc.*, **42**, 2, pp. 201–212, 1 pl., 9 fig., 1 graph, 1959. [19 ref.]

At the Univ. Coll. N. Wales, Bangor, Early Bird and Laxton's Superb peas were inoculated by growing them in compost mixed with a suspension of the conidia-like cells of *F. solani* var. *martii* f. 2 [*F. solani* f. *pisi*: **37**, 633; **38**, 345, 652] produced in submerged, shaken potato dextrose cultures. At weekly intervals for 10 weeks isolations were made from portions of the root and foot, the excised tissue being sterilized 20 sec. in 1% $HgNO_3$ and then washed in 5% NaCl followed by water before plating. The parts yielding *F. s.* f. *pisi* were noted and it was apparent that the foot, the only area to develop a clearly defined, dark lesion, was infected first, and most severely, and the roots only gradually, and mildly. After 1 week black flecks appeared on the cotyledon stalks, epicotyl (below ground), hypocotyl, and upper taproot. Initial infection was often via stomata. Sporodochia formed on the foot lesions and the testas. Infection of aerial parts did not normally occur except under very humid conditions.

Air dispersal was shown to take place over at least 4 ft., also conidial dispersal by air currents from dry sporodochia, on dry soil particles, and by water splashes on sporodochia. Spread in the soil was investigated by separating healthy and infected roots by stretched nylon mesh that allowed the passage of mycelium but not of roots, and also by intertangling the roots. *F. solani* was thus shown to spread slowly by root contact, but not by growth in soil in the absence of the host. On glass slides in garden soil at different moisture contents the fungus did not grow, but formed chlamydospores.

Davey (C. B.) & Papavizas (G. C.). **Effect of organic soil amendments on the Rhizoctonia disease of Snap Beans.**—*Agron. J.*, **51**, 8, pp. 493–496, 2 fig., 1959.

At the Crops Res. Div., Beltsville, Md, a soil inoculum was obtained by inoculating loamy sand with soil from a field of young snap beans [*Phaseolus vulgaris*] infested with *R.* [*Corticium*] *solani*, built up by raising 8 consecutive crops of snap beans and ploughing them in. Aliquots of the inoculum and also various mature and

green organic residues were added at 2 and 1% oven-dry wt. of soil, respectively. Three successive crops of snap beans were raised in the mixtures on greenhouse benches following an initial fallow period of 28 days. The 1st 2 plantings were harvested after 24 days, the 3rd was allowed to mature. The infection index for each planting was determined: all the amendments affected the number of micro-organisms in the soil and the bean rhizosphere and also the severity of attack by *C. solani*; mature cereal straws gave considerable protection against *C. solani* soon after application to soil, but their effectiveness decreased rapidly with time. The lag period between the application to soil of mature leguminous crops and the suppression of *C. solani* was very long; the numbers of rhizosphere fungi and the ratio of bacteria/streptomycetes were more closely related to the disease index, than the rhizosphere/soil ratios for the various groups of micro-organisms.

Scharen (A. L.). **Comparative population trends of Xanthomonas phaseoli in susceptible, field tolerant and resistant hosts.**—*Phytopathology*, **49**, 7, pp. 425–428, 2 graphs, 1959.

At the Univ. Nebraska, Lincoln, Great Northern bean (*Phaseolus vulgaris*), susceptible to *X. phaseoli*, Tepary bean (*P. acutfiolius* var. *latifolius*), resistant, and Scarlet Runner (*P. coccineus*), tolerant, were inoculated in the greenhouse by watersoaking the leaves, or parts of them, with a bacterial suspension applied under pressure from an atomizer. Sample disks were cut from the leaves at 2-day intervals for 17–25 days, macerated, and used for colony plate counts to estimate the bacterial content of the leaf.

When inoculum contained 10^6 viable bacterial cells/ml. the bacteria multiplied in the tissues of all 3 spp. for 5–6 days after inoculation, then declined, but increased again with the appearance of symptoms, which on Tepary consisted of bright yellow midribs and veins with interveinal dark green necrotic areas, the others developing typical lesions as in the field. Tepary was killed sooner and by fewer bacteria than the susceptible beans. With 2×10^4 bacterial cells/ml., however, fewer were found in Tepary at all stages, the population reaching its initial peak in 10 days. No symptoms appeared in Tepary (in which the bacterial population decreased sharply and then rose slowly); the other 2 died.

Spray inoculation (inoculum 2×10^7) without watersoaking and needle puncture (10^7) produced no infection in Tepary, though both the other spp. were killed. The results suggest that the host may temporarily reduce the bacterial population in all vars, and that in resistant vars. no further multiplication occurs.

Tedoradze (S. G.). Устойчивость сортов Фасоли к бактериозам в Грузии. [The resistance of Bean varieties to bacterioses in Georgia.]—Защ. Раст., Москва [*Zashch. Rast., Moscow*], **4**, 2, p. 51, 1959.

Among bacterioses widely disseminated in the Georgian S.S.R., beans suffer the greatest damage (at times 100%) from *B*[*acterium*: *Xanthomonas*] *phaseoli* [cf. **36**, 296] and *B. medicaginis* var. [*Pseudomonas medicaginis* f.sp.] *phaseolicola* [cf. **34**, 830]. Incidence depends on vars. and weather conditions. Low temp. and sufficient atmospheric humidity favour the development of *X. phaseoli*. The author reports from the Georgian State Selection Station that 406 bean vars. and hybrids were examined for bacterioses, and of these 291 were susceptible. Climbing and semi-climbing vars., both shelling and vegetable types, are more susceptible than bush vars.; in general, the vegetable are more susceptible than the shelling; some are completely resistant. Especially resistant are Chokhatauris 23, Tsilkanskaya 411, Korichnevaya 403, and others. In Eastern Georgia, and also in the higher western areas, in places with comparatively low atmospheric humidity, open flower vars. are much more susceptible. The same is true of very downy vars. with wrinkled leaves, when exposed to infection. Field observations showed that

those with white flowers are seldom infected and those with pink, blue, or lilac highly susceptible, because of bee transmission. Infection by *X. phaseoli* on Tsanava 3, which is slightly susceptible to bacteriosis, was 63·4–81·2% with early sowing (5–10 Apr.), 11·28–16·5% with middle (15, 20, and 25 Apr.), and up to 58·2% with very late sowing (15 May), when *P. m.* f.sp. *phaseolicola* developed strongly. Old bean seed (3 yr.) was less susceptible to bacterioses (4·1%) than new seed.

Downy mildew on Lima Beans.—*Plant Dis. Reptr, Suppl.* 257, pp. 177–186, 1 fig., 1 graph, 1959.

F. App (pp. 177–178) outlines the history and economic importance of Lima bean [*Phaseolus lunatus*] downy mildew (*Phytophthora phaseoli*). In Delaware in 1958 the loss from 11,675 acres was estimated at 2,510,884 lb. R. A. Hyre (pp. 179–180) describes the development of a method for forecasting outbreaks [cf. **36**, 630]. R. E. Wester & R. C. Cetas (pp. 181–182), on breeding for resistance, state that Piloy (P.I. 189403) from Guatemala has proved highly resistant to race B and to race A [**38**, 437]. J. W. Heuberger & D. F. Crossan (pp. 183–186) deal with control by fungicides [**37**, 62]. Maneb spray (2 lb./100 gal.) was the most effective of the fungicides tested commercially in 1957–8.

Jones (J. P.). **Purple stain of Soybean seeds incited by several Cercospora species.**—*Phytopathology*, **49**, 7, pp. 430–432, 1 fig., 1959.

At the Miss. agric. Exp. Sta., Stoneville, when 18 isolates of 13 *Cercospora* spp. from 13 hosts, both leguminous and otherwise, were inoculated hypodermically into attached developing soybean pods (at the 'filled' stage), 10 spp. induced purple staining in the enclosed seeds, as with *C. kikuchii* [cf. **35**, 861]; re-isolates were made from the discoloured seed. The spp. that caused staining also produced purple pigment in culture and were alike morphologically. Marked similarities in morphology and cultural characters were also noted between *C. sojina* [**38**, 50] from soybean and *C. cruenta* from cowpea, but cross inoculations showed them to be distinct.

Dubey (H. D.). **Influence of nitrogen, phosphorous, and potassium fertilizer on the mortality of Peanut caused by root rot disease.**—*Agron. J.*, **51**, 6, pp. 369–370, 2 fig., 1959.

This information from the Deochanda Experiment Station, Bihar, India, on groundnuts root rot (*Sclerotium rolfsii*) has been noticed [**38**, 438].

Diener (U. L.). **The mycoflora of stored Peanuts.**—Abs. in *J. Ala. Acad. Sci.*, **30**, 2, pp. 5–6, 1958.

In June 1957 the predominant fungi isolated at the Polytechnic Institute, Auburn, Alabama, from farmer stock groundnuts kept in 26 bins made of several types of steel and wood were *Aspergillus ruber*, *A. repens*, *A. chevalieri*, *A. restrictus*, *A. amstelodami*, *A. tamarii*, *Penicillium citrinum*, *P. funicolosum*, *P. janthinellum*, *Torula sacchari*, and *Candida* sp. Less abundant were 13 other spp., including six *A.* The 1st 5 (all *A. glaucus* group) comprised 40–100% of the population in 45% of the samples. The mould counts ranged from 7 to 1,350,000 colonies/g. The large numbers found after 20 months' storage in wood-vent bins resulted from a high initial moisture content of the nuts.

Dickson (R. C.) & Laird (E. E.). **California desert and coastal populations of flying aphids and the spread of Lettuce mosaic virus.**—*J. econ. Ent.*, **52**, 3, pp. 440–443, 1959.

At the University of California Citrus Experiment Station, Riverside, the rate of

spread of lettuce mosaic virus was determined by the population of efficient vectors, notably *Myzus persicae*, during the growing season [**32**, 534]. A dense population of *Aphis gossypii*, a fairly active carrier in the laboratory, did not cause measurable spread. *Macrosiphum barri*, here reported for the 1st time as a vector, appeared to be as efficient as the other 2.

GRANITI (A.). **Tentativi di lotta contro il marciume del colletto della Lattuga.** [Attempts at the control of collar rot of Lettuce.]—*Ital. agric.*, **95**, 8, pp. 493–501, 7 fig., 4 graphs, 1958. [39 ref.]

Two months-old Trocadero lettuces at Molfetta, near Bari, Apulia, were treated on 1 Apr. 1958 by pouring round each 250 or 500 ml. of a 0·5% solution of a product containing 75% pentachloronitrobenzene. On 24 Apr., the day before the crop was picked, the percentage of plants with collar rot (*Sclerotinia* spp. and *Botrytis* spp.) [cf. **25**, 535] averaged 20·2 for the 2 plots treated at the higher rate (as against 37 for the 2 control plots) and 14·1 for the 2 treated at the lower rate (20·2 for the controls).

TOLSMA (S.) & VAN HOOF (H. A.). **Virusziekte in Rhabarber.** [Virus disease of Rhubarb.]—*Meded. Dir. Tuinb.*, **22**, 2, pp. 115–116, 1959. [Engl. summ.]

During the 3rd and 4th yr. of a comparative trial of healthy and virus-diseased rhubarb plants (3 rows of 6 in each group) at the Instituut voor plantenziektenkundig Onderzoek, Wageningen, Netherlands [**36**, 372], the yield of the latter was reduced by 23% in respect both of weight and financial gain. The 1st 2 diseased plants in the healthy rows were found in the 3rd yr., while infection developed in another 6 during the 4th. Judging by the slow rate of spread, transmission is thought to be more likely due to spontaneous root grafting than to insects.

MAZZONE (H. M.) & KAESBERG (P.). **Biochemical studies of Squash mosaic virus and related macromolecules.**—Abs. in *Fed. Proc.*, **18**, 1, Part I, p. 285, 1959.

The sedimentation coefficients ($S_{20,w}$) of 3 macro-molecular particles produced by infected squash plants [**36**, 299; **38**, 52], purified, and separated by sucrose density gradient centrifugation at the Dept of Biochemistry, University of Wisconsin, were 57, 95, and 118 for the top, middle, and bottom components, respectively, the corresponding mol. wts. being $4{\cdot}3\times10^6$, $6{\cdot}9\times10^6$, and $9{\cdot}2\times10^6$. The ribonucleic acid content of the middle component was about 30% and of the bottom, 40; the top contained less than 3%. The particles of all 3 were shown by X-ray scattering data to be nearly spherical, the top one being hollow, the bottom of relatively uniform density, and the middle apparently intermediate. The 3 were mutually related serologically and resistant to reagents and conditions known to alter microsomal particle structure. The bottom component was infectious and is believed to be the virus itself.

KNEEBONE (L. R.) & MEREK (E. L.). **Brief outline of and control for Mushroom pathogens, weed moulds, indicator moulds and competitors.**—*M.G.A. Bull.* 113, pp. 146–152; 114, pp. 190–194; 115, pp. 226–228; 116, pp. 252–255; 22 fig., 1959.

These notes, in popular terms, prepared for a short course on the mushroom industry at Pennsylvania State University, deal with 23 of the more common fungal, bacterial, and allied diseases of mushrooms; the causal organism (when known), symptoms of the disease, factors favouring infection, and the mode of spread are described. Appropriate control means are suggested for each.

Ochs (Gertrud). **Ein Virus als Erreger der Rollkrankheit der Rebe.** [A virus as agent of the leaf roll disease of the Vine.]—*Experientia*, **15**, 8, p. 303, 1959. [Engl. summ.]

A virus was isolated from 400 leaf roll-diseased vines [cf. **37**, 388] at the Botanisches Institut, University of Freiburg (Breisgau), Germany, as well as from 64 out of 94 specimens submitted for examination, in 35 of which the symptoms were latent. It was bolt-shaped, cylindrical, 795 A in length, and clearly discernible under the electron microscope at a magnification of 14,000. The virus was successfully transmitted from diseased scions to healthy stocks and vice versa in 88 out of 100 tests, the occurrence of infection being demonstrated after 6 weeks, though the external symptoms remained latent for at least 72 days. In a further series of 100 experiments, in which infected stocks were united with healthy scions, the course of infection was followed daily and virus elements were observed to develop as early as 7–14 days after inoculation.

Dunin (M. S.) & Dement'eva (Mme M. I.). О сроках опрыскивания виноградников против мильдью. [On the times for spraying vineyards against mildew.]—*Vitic. and Wine-Mak., Moscow*, **18**, 6, pp. 35–41, 3 graphs, 1958.

In this paper from the K. A. Timiryazev Agricultural Institute, Moscow, the authors review various contributions by other workers on vine mildew [*Plasmopara viticola*] and reach a number of general conclusions. In regions with high dewfall, liable to new infections daily, spraying [**38**, 558] based on incubation periods is not appropriate, but should be related to the dynamics of the vine growth and the formation of new leaves. In certain circumstances a min. night temp. of 8–10° C. may be taken as a signal to start spraying rather than the accepted av. 13°. Subsequent sprayings should be applied usually after the growth of 4 or 5 new leaves, but if weather conditions change to humid, after 3 new leaves, whereas with protracted dry weather without sharp fluctuations in temp. and night dew 5–6 or even 7 new leaves might be allowed to form before another spray. In low-lying and more humid sectors 1–2 additional applications may be given.

Berry-Smith (F.). **Control of pests and diseases of glasshouse Grapes.**—*N.Z.J. Agric.*, **98**, 6, pp. 577, 579, 581, 3 fig., 1959.

These notes [cf. **30**, 357] include recommendations for control of powdery mildew (*Uncinula necator*) [**34**, 375] by S dusting, which should not, however, be practised when the temp. is > 90° F. Ripe rot (*Glomerella cingulata*) and *Botrytis cinerea* are not generally serious in well-ventilated houses. To control *Phoma flaccida* [cf. **36**, 635] causing excoriosis, affected laterals should be cut out and burnt and the vines then sprayed with 10:10:50 Bordeaux, but the disease is comparatively rare. The use of smoke generators and tecnazene [cf. **37**, p. 622] against powdery mildew and *Botrytis* infection is recommended.

Boehm (E. W.). **Wine grape varieties for new plantings.**—*J. Dept. Agric. S. Aust.* **62**, 10, pp. 429–435, 4 fig., 1959.

White grape vars. are reported to be generally more susceptible to *Oidium* [*Uncinula necator*: **37**, 67] than black. Observations at the Viticultural Research Station, Nuriootpa, indicated that the sultana vars. and the table grape Ohanez are the most prone to black spot [*Elsinoe ampelina*: loc. cit.]: Mataro, Carignane, Sercial, and Verdeilho were very slightly infected by black spot; Cabernet Sauvignon, Rhine Riesling, Shiraz, White Hermitage, White Madeira, and White Tokay remained uninfected.

Gärtel (W.). **Beobachtungen über den Einfluß der Kaliumernährung auf das Auftreten von Oidium bei Amerikanerreben.** [Observations on the influence of

potassium nutrition on the appearance of *Oidium* on American vines.]—*Weinberg u. Keller*, **6**, pp. 81–85, 2 graphs, 1959.

Experiments at the Institut für Rebenkrankheiten, Bernkastel-Kues, Mosel, Germany, established a definite relationship between the degree of damage caused by K deficiency and infection by *Uncinula necator* in the Berlandieri × Riparia crosses 5 C and 5 BB. The stronger the K deficiency symptoms, the more susceptible are laminae and internodes to infection, which can be reduced to a minimum by adequate provision of K.

Thirty-ninth Report of the National Institute of Agricultural Botany, Cambridge, 1958.—56 pp., 1959.

In the section on mycology (pp. 21–23) [cf. **37**, 633] it is reported that the level of infection of yellow rust [*Puccinia striiformis*] was low except on some susceptible [wheat] vars., notably Merlin (50%) and 9/3/1 (10–15%); the indication in 1957 that incidence in Cappelle Desprez was slowly increasing is being confirmed. Race 8b was predominant in collections made during July and Aug., but race 2b was also found. Slight infection by black rust [*P. graminis*] was recorded at the end of July; only race 21 was identified. Barley infected by mildew [*Erysiphe graminis*] suffered a reduction in yield of about 1½–2 cwt./acre.

The Potato Branch reports (pp. 23–27) that stem-end blackening in cooked potatoes results not so much from differences in pH as from differences in the conc. of citric acid, and the increase in discoloration in stored potatoes is associated with a sudden decrease in this conc. when sprouting begins. Of 40 samples of blight [*Phytophthora infestans*] from resistant and susceptible vars., all from Majestic were race 4 and all from Ulster Torch race 1,4. The frequency of race occurrence was: 25 samples of 1,4, 11 of 4, 2 of 2,4, and 1 sample each of 0 and 3,4. In a trial to assess susceptibility to blight under field conditions the percentages of blighted tubers after 5 weeks' storage were: Ulster Beacon, 1, Majestic, 2 (both regarded as susceptible), Pentland Ace, 3, and Ulster Torch, 8 (both resistant) [**38**, 651]. The development of blight in a glasshouse test was more extensive on leaf roll infected plants than on non-infected and they held blighted leaves longer [**37**, 106]. Of the main crop vars. at different centres Arran Viking proved the most susceptible to leaf roll, and Majestic, Ulster Beacon, Ulster Supreme, Ulster Torch, and Ulster Tarn the most resistant, in this order. The order for severe mosaic (virus Y) was generally the same, except that Ulster Supreme was the most resistant; Majestic and Arran Viking were comparatively tolerant. The field resistance of Ulster Tarn may be partly due to the fact that aphids apparently dislike this var. Of 3,590 leaf samples from multiplication plots, virus X was detected in nearly 4%. Symptoms resembling those caused by beet ring spot virus [cf. **38**, 330] were observed in several crops of Majestic growing in Lincs. The symptoms were necrotic spots, arcs, and chevrons on the apical leaves of stunted stems. Most samples gave negative results on test plants, but one, from a plant which also had necrotic rings on the lower leaves, produced symptoms resembling those of beet ring spot virus on tobacco, *Phaseolus vulgaris*, and *Chenopodium quinoa*.

Korte verslagen van de voordrachten, gehouden op de planteziektendagen, 5 en 6 Februari 1959, te Wageningen. [Brief reports of papers delivered at the sessions on plant diseases on 5 and 6 Feb., 1959, at Wageningen.]—Abs. in *Tijdschr. PlZiekt.*, **65**, 2, pp. 61–72, 1959.

Among the 24 papers covered, the substance of some which has been noticed, mention may be made of those by H. C. Bels-Koning, 'Diseases in mushroom culture'; D. I. Zandee, 'The life cycle of *Didymella applanata* on raspberry'; A. F. G. Slootweg, '*Fusarium* infection of flower bulbs, in particular the "sour

disease" of tulips' (caused by a race of *F. oxysporum*); P. K. Schenk, 'Biology and control of *Septoria gladioli* on gladioli' [cf. **38**, 261]; H. den Ouden & R. E. Labruyere, 'The significance of *Hoplolaimus uniformis* and *Fusarium oxysporum* in the occurrence of early yellowing of peas'; this disease is always associated with a heavy infestation of *H. uniformis* in the soil, and *F. oxysporum* in the roots; H. Van Vloten & H. A. Van der Meiden, 'Rust (*Melampsora larici-populina*) and canker (*Dothichiza populea*) of poplar' [**38**, 341]; F. Tjallingii, 'Physiological specialization of club root [*Plasmodiophora brassicae*] and the cultivation of resistant races of "stoppelknolle" [*Brassica* sp.]'; A. Kaars Sijpesteijn, 'Organic tin compounds as potential agricultural fungicides' [cf. **38**, 59]; A. P. Kole & K. Horstra, 'Electron-microscope observations of zoospores of *Phytophthora infestans*'; and A. B. R. Beemster, 'Does the translocation of X and Y virus in the potato plant occur in like manner?'; following leaf inoculation the pattern of transport in the stems is similar for the 2 viruses. With virus Y there was a certain amount of translocation into the tubers at the time of ripening, but this was not seen with X virus, perhaps because the experiments were not sufficiently prolonged.

Report of the Department of Agriculture, N.S.W., for the year ended 30th June 1958.—128 pp., 20 fig., 1959.

Much of the information in the plant pathology section (pp. 68–75) of this report submitted by the biol. Branch, Div. Sci. Serv. [cf. **38**, 120] has been noticed [**38**, 563 *et passim*]. Anthracnose (*Colletotrichum trifolii*) of red clover appeared for the 1st time in several years [**35**, 422] during hot humid weather in late summer; rust (*Uromyces trifolii*) [**35**, 455] damaged subterranean clover in the autumn. Anthracnose (*C. trifolii*) of lucerne occurred for the 1st time since 1915; the establishment of lucerne in southern districts was hampered by damping-off (*Pythium debaryanum*). The cause of a rare occurrence of root rot of golden tares [vetch] in 1957 in Raleigh was identified as *Cylindrocladium* sp.

The loss of certified seed potatoes caused by *Fusarium trichothecioides* [cf. **38**, 30, 564] averaged 22% (Sebago and Sequoia, 2–80). Recommendations for tomato seed treatment against *Corynebacterium michiganense*, more widespread than usual, now include HCl [**38**, 102]. A disease similar to that caused by squash mosaic virus was reported for the 1st time at Milperra, where up to 100% of marrow and squash plantings were infected in early March, while 40–50% infection of pumpkin and marrow plantings was recorded for the 1st time at Cornwallis. Black root (*Aphanomyces raphani*) [cf. **32**, 293] caused about 100% loss of radishes in Sydney market gardens.

Lemon crinkle [-leaf] virus [**37**, 134] is now regarded as distinct from citrus psorosis virus. 'Joppa ring', a ring of corky, broken bark at the bud union of Joppa oranges, is now under investigation. 'Yellow ring' of nucellar Eureka lemons is characterized by a general decline, yellowing, and leaf fall, associated with an indented ring and gumming at the bud union. Woody gall of rough lemon stocks, but not affecting the sweet orange scions, was recorded from several areas on the central coast; it was graft transmissible and is considered to be a virus. *Coprinus micaceus* is consistently associated with sudden death of citrus [cf. **38**, 563] at Koraleigh and Griffith.

The spore discharge/sq. in. of apple leaf litter infected by *Venturia inaequalis* [cf. **38**, 120], collected on 28th Oct. and variously treated, was: 2,893 (water treated), 11 (0·01% phenyl mercuric chloride, PMC), 0 (0·05 and 0·1% PMC), 3,426 (1% $CuSO_4$), and 2,165 (1–10 lime S). Clear evidence was obtained for the graft transmissibility of the condition known as pear 'rough bark'. Investigations into the epidemiology of brown rot (*Sclerotinia fructicola*) of stone fruit [cf. **38**, 16] in the Murrumbidgee Irrigation Area indicated a diurnal periodicity in spore

flights reaching a max. in mid afternoon; some spores were still viable after 10 months in a dry state, but subject to atmospheric variations in humidity; no germination occurred after 12 months. Severe bacterial spot (*Xanthomonas pruni*) [cf. **27**, 189] occurred on Wickson plums at Medowie and on Ruby Blood at Orange; varietal differences in susceptibility were very evident in a mixed planting.

Severe crown rot (*Sclerotium rolfsii*) of carnation plantings was noted in the 'Hills' district. Black rot (*Xanthomonas incanae*), a seedborne disease of stock [*Matthiola incana*], was severe in commercial plantings.

VASUDEVA (R. S.). **Report of the Division of Mycology and Plant Pathology.** –*Sci. Rep. agric. Res. Inst. N. Delhi, 1954–1955*, pp. 87–101, 1957. [Received Aug. 1959.]

Some of the information under the plant pathology section (pp. 87–94) [cf. **35**, 280], has been noticed. From 442 rust samples [**35**, 92] from wheat and 3 from wild grasses 7 races of black rust (*Puccinia graminis*), 9 of brown rust (*P. triticina*) [*P. recondita*], and 7 of yellow rust (*P. glumarum*) [*P. striiformis*] were obtained. Race 77 of *P. recondita* [**35**, 172] was collected on Mediterranean, N.P. 798, N.P. 809, Fund. and Botla and was found to be widely distributed in Punjab, Bombay, Bihar, and U.P. The virulent race 122 of black rust [**35**, 280], 1st reported in 1953, was again found in the Kuln Valley in Punjab and Delhi State, while 2 mutants of race 194 differed from the parent race in culture, but not in pathogenicity. The wheat var. N.P. 755, inoculated with loose smut (*Ustilago tritici*) [*U. nuda*] and treated with solar heat, remained completely free from infection, whereas plants from untreated seed developed 23·5% infection [cf. **37**, 469]. Samples from the bulked N.P. 775 and N.P. 781 treated likewise developed 0–0·39% infection against 2·1–4·6% in the control. In varietal tests N.P. 785 and N.P. 786 were 11·7 and 7·5% infected by bunt (*Tilletia foetida*), respectively; the range for the other 29 vars. was 50·9–93·9%.

Spores of *Neovossia indica* collected from different States during Apr. germinated from Sept. onwards, indicating the need for a resting period. Better germination (up to 80% in 10 days at 15–22° C.) was obtained in farmyard manure extract or in a solution containing a N source. It was established that the disease is air-borne and infection floral; no infection could be obtained through infested seed or soil.

From 9 rust collections of barley, races 21, 34, and 42 of *P. graminis tritici* and race G of *P. striiformis* were identified. Leaf rust (*P. hordei*), rare on barley in India, was isolated from a few collections from Delhi, U.P., and the Nilgiris.

Red rot (*Colletotrichum falcatum*) [*Glomerella tucumanensis*: **38**, 32, 582] was epidemic on sugarcane in certain areas in Punjab; Co. 312, Co. J. 33, and Co. L. 29 were chiefly affected. The pale type isolates of the fungus as usual were more virulent than the dark; a mixture generally gave more infection than the individual strains or other combinations thereof. There was no significant increase in infection when the dose of the inoculum was doubled; the ratoon crop was slightly more susceptible than the plant crop. In resistance trials *Erianthus hookeri*, *E. arundinaceum*, and *Narenga* (S.E.S. 201) were resistant, and *Sclerostachya* (S.E.S. 216) was moderately so [**37**, 418]. Four hybrids of *S. officinarum* × *Narenga* and 2 of *S. officinarum* × *Sclerostachya* were moderately resistant, while *S. robustum* × *Sclerostachya* was susceptible.

In tests with smut (*Ustilago scitaminea*) [loc. cit.] on 72 vars. at Delhi, 11 had less than 5% infection; the numbers with 5–15, 15–30, and 30–100% were 3, 14, and 34, respectively; the corresponding figures for 88 vars. at Karnal were 25, 23, 13, and 27.

Linum mysorens, which grows wild in the hills of India, was found to be a new host of *Melampsora lini* [**36**, 186].

Soil infested by oospores of *Sclerospora graminicola* and weathered since 1951 was infectious to bajra [*Pennisetum typhoides*: **35**, 603]. Seed collected from heavily infected fields in 2 localities gave 8 and 12% infection, indicating that the disease may be seed-borne.

Using *Alternaria solani* to assay the antibiotic from *Bacillus subtilis* [**38**, 187], it was shown that the presence of $MgSO_4$ in the fermentation broth was the most important factor for the growth of the bacterium and for antibiotic production. In preliminary tests 7 antibiotics proved ineffective against infection of wheat seedlings by *Puccinia graminis tritici*.

The importance of the interrelationship between carbohydrate and vitamin nutrition for the growth and sporulation of *Lophotrichus ampulus* [**35**, 281] was established. Suppression of sporulation by glucose was accompanied by greater accumulation of fat in the mycelium. Sucrose is apparently converted directly into glucose-1-phosphate.

When sugarcane 'seed' cuttings were steeped for 10 min. in aretan (1 lb. 20 gal.) at planting, germination was increased by 10% and yield by 15%; an instantaneous dip in 1 lb./10 gal. gave 10% increase in germination and 6% in yield [cf. **37**, 310].

Corynebacterium tritici, the cause of tundu disease of wheat [**34**, 634; **35**, 278], was found to be a strain of *C. rathayi*. An etiological relationship between the bacterium and the nematode *Anguina tritici* has been confirmed.

A serious disease of guava, characterized by interveinal chlorosis, extreme reduction in leaf size, suppression of growth, and die-back of leaders, reported 1st in 1949, was considered attributable to nutritional deficiency. At Ajmer spraying 556 guava trees (2–13 yr. old) with 1 lb. $ZnSO_4$+0·7 lb. hydrated lime 16 gal. restored normal growth; younger trees required 2–3 sprays, older ones 4–5.

Studies of *Macrophoma mangiferae* on mango [**35**, 281] showed a mutant to be more virulent than the parent strain. The host range of both included fig, vine, *Eugenia jambolana*, and loquat. The mutant strain produced perithecia on mango leaf extract agar similar to those of *Phomatospora* sp.

In preliminary investigations on mushroom cultivation cultures of the rice straw mushroom (*Volvaria diplasia*) [**27**, 61] from Calcutta and Coimbatore differed in yield and cap colour.

In the section on plant viruses (pp. 94–98) it is noted that 'smalling' and severe mottling of tomato leaves, serious in the Simla Hills, is caused by a virus which could not be transmitted by sap inoculation but was transmissible by grafting to tomato and 7 other solanaceous hosts.

Croton sparciflorus and *Ageratum conyzoides* were found to be additional hosts of yellow vein mosaic of bhindi [*Hibiscus esculentus*: **35**, 279]. *Abelmoschus manihot* var. *pungens* could not be infected even when colonized by 50 viruliferous white flies [*Bemisia* sp.] but *Zinnia elegans* was infected by inoculation.

A severe type of leaf curl disease of chilli [*Capsicum* sp.: loc. cit.], characterized by curling and puckering with suppression of flowers and stunting of axillary shoots, and observed in the Pushkar Valley and Ajmer, is caused by tobacco leaf curl virus.

Brinjal [eggplant] mosaic virus [**38**, 52] could not be transmitted to *Hyoscyamus niger*, papaw, *Datura stramonium*, or *Solanum torvum* and is not seedborne. The eggplant vars. American purple, Florida market, 3–4–5–7, and 4–4–6–9 were susceptible. Of 11 plant spp. studied, only *Vinca rosea* proved susceptible to eggplant little-leaf virus [**35**, 280]. The incubation period of the virus was 8 days in summer and 31 in winter. *Eutettix phycitis* transmitted the virus in 1 hr. and retained it throughout its life; 3rd and 4th instar nymphs also transmitted it.

In host range studies pumpkin yellow vein mosaic virus [**35**, 282] was transmitted to cucumber and *Lagenaria siceraria* but not to 16 other hosts.

Cutting back affected plants as a measure of control of papaw leaf curl [**35**, 281;

36, 41], now shown to be caused by tobacco leaf curl virus, has not arrested the disease.

Banana mosaic virus [**35**, 749] was again readily transmitted to banana by *Aphis gossypii* after 30 min. feeding. Sugarcane mosaic virus [**39**, 39] was successfully transmitted to the sugarcane vars. Co. 313 and Surkha Saharanpuri by *A. maidis* but not to Co. 213, Co. 312, or Co. 798. *Toxoptera* sp. was established as an additional vector. Maize mosaic virus [**35**, 281] was transmitted to *Brachiaria ramosa* and *Digitaria bifasciculata* but not to Surkha Saharanpuri. *Phalaris minor*, a common weed, carries the virus symptomlessly. The *Toxoptera* sp. which transmitted sugarcane mosaic virus also transmitted maize mosaic virus.

Sarson [Indian mustard] mosaic virus could not be sap transmitted to 10 cruciferous spp. nor by grafting to cabbage or *Matthiola incana*. The thermal inactivation point lay between 60 and 70° C. and the dilution end point between 1:1,000 and 1:10,000. *Macrosiphum granarium* [*M. avenae*] was found to be the vector.

White fly [*Bemisia* sp.] could carry 3 different viruses (yellow vein mosaic viruses of pumpkin and *H. esculentus* and mosaic virus of Lima bean [*Phaseolus lunatus*: bean common mosaic virus]) simultaneously for 6 days. Cardamon katte disease virus did not persist in the vector [*Pentalonia nigronervosa*] after 1 feed on a healthy plant.

When leaves of *Gomphrena globosa* inoculated with potato virus X (1:10) were exposed immediately to ultra-violet rays for 5, 10, and 15 min. inhibition of 60, 70, and 92% respectively, was obtained, judged by the lesions produced. Similar treatment 7 days after inoculation gave 22, 30, and 48% inhibition. Thiouracil and staling products of *Aspergillus niger* grown for 21 days at 22–25° and leaf extracts of chilli [*Capsicum* sp.], spinach, and strawberry all inhibited multiplication of this virus. Mango malformation disease [**36**, 707] could not be transmitted by grafting nor by *Idioceras* sp. or *Deltocephalus* sp.

The section on systematic mycology (pp. 98–106) lists taxonomic studies and refers to the Indian type culture collection and Herbarium collection. In conclusion the programme of work for the year 1955–6 is outlined.

Bureau of Plant Pathology. Bureau of Plant Quarantine ex Thirty-ninth Annual Report, Department of Agriculture, California, for the period ending 31 December 1958. *Bull. Dep. Agric. Calif.*, **48**, 2, pp. 136–144, 2 fig.; pp. 145–148, 1959.

The plant pathology report [cf. **38**, 177] by G. L. Stout & G. A. Alstatt records club root (*Plasmodiophora brassicae*) of cauliflower for the 1st time in Alameda County. No new infection areas were found outside that quarantined for citrus tristeza virus. Pink patch caused by *Corticium fuciforme* [cf. **37**, 50] was observed on a number of lawn specimens from several coast counties. Two instances of yellow leaf blister of poplar (*Taphrina aurea*) occurred. Twig blight (*Coryneum berkmanii*) [**19**, 683] on arborvitae (*Thuja orientalis*) is the 2nd Bureau record of this disease. *Pseudomonas savastanoi* caused fruit lesions on olive [**31**, 25].

The Plant Quarantine report is presented by A. P. Messenger and E. A. Breech.

Annual Report for the Agricultural Experimental Stations, Florida, for the year ending June 30, 1958.—411 pp., 37 fig., 2 diag., 9 graphs, [? 1959].

Some of the information in this report has already been noticed. Under the Plant Path. section (pp. 136–144) [cf. **37**, 699] C. W. Anderson notes that 2 cowpea strs. of cucumber mosaic virus may often be used to identify other strs. immunologically, with tabasco pepper [*Capsicum* sp.] as the immunized plant. Graft inoculations showed that virus or virus-like diseases unrelated to the capsicum virus problem

occur in *Solanum carolinense*, which may also be infected by capsicum viruses in the field.

H. N. Miller reports heavy losses from a soft rot or break down of *Sansevieria* leaves following cool wet weather. A *Fusarium* sp. [**36**, 810] is associated consistently with the disease complex. During the winter months dipping *Philodendron* plants, before packaging in unventilated containers, in solutions of agrimycin panodrench, actidione S, or thylate greatly reduced losses from [unspecified] bacterial soft rots, but none gave complete protection.

Terraclor and terraclor-captan combinations as soil drenches or as seed treatments gave almost 100% control of damping-off of annuals caused by *Rhizoctonia* sp., but terraclor was not effective against *Pythium* sp. Nabac (2, 2 methylene bis, 3, 4, 6-trichlorophenol) gave excellent control as a soil drench.

S. A. Ostazeski & P. Decker found that diseases of importance on blue lupin were stem canker (*Botrytis cinerea*), grey leaf spot (*Stemphylium solani*) [**37**, 483], root rot (*Fusarium* spp.), and southern blight (*Sclerotium rolfsii*). The most prevalent disease of yellow lupin was again bean yellow mosaic virus [loc. cit.]. The most serious disease on both lupins was brown spot disease (*Pleiochaeta setosa*) [**37**, 700]; seed sown in sterile soil produced about 18% infected stand, a rate of seed transmission more than adequate to initiate severe epiphytotics. M. K. Corbett reports that in Mar., apparently a critical period for seed set, bean yellow mosaic virus infection of sweet yellow lupin was 26·37% in a plot protected by an immune border crop, compared with 93·13% in one unprotected.

'Grey-wall' [**36**, 808] continues to be serious in winter tomatoes. The infected fruit show internal browning and vascular necrosis, but while tobacco mosaic virus [cf. **38**, 487] may be isolated from such fruit, all attempts to reproduce the symptoms with this virus alone have been unsuccessful.

R. G. Orellana states that a *Phytophthora* sp. associated with a root rot complex in castor beans proved to be pathogenic, and to tobacco and soybeans also. Some progenies of the 3rd backcross of Cimarron castorbean from Davis, Calif., proved highly resistant to bacterial leaf spot (*Xanthomonas ricinicola*) [**33**, 631].

M. K. Corbett & C. W. Anderson report that attempts to concentrate, purify and electron-microgram the virus from Cattleya orchids [**37**, 484] which induces local lesion formation on leaves of *Cassia occidentalis* have not been successful. Cattleyas with purplish black sunken leaf necroses are quite common and late stages of the disease are identified readily, but not the early ones.

H. H. Luke found that selected mutants from the susceptible oat var. Fulgrain, resistant to blight (*Helminthosporium* [*Pyrenophora*] *avenae*) [**36**, 641], have the same resistance as their parent to certain races of crown rust [*Puccinia coronata*: **38**, 512], but neither is as resistant as Victoria to race 205. These mutants carry the same rust resistance as Fulgrain and Victoria to race 290, but are not susceptible to blight. Excellent resistance to race 264 was found in lines of irradiated Floriland, but all were susceptible to race 290 at Quincy. In a series of rye seed treatments both ceresan M and ceresan 100 increased (by approx. 25%) germination and seedling survival of Gator, which had suffered about 50% reduction in germination due to *Helminthosporium* sp.

T. E. Freeman reports that during the autumn of 1957 cottony blight (*Pythium aphanidermatum*) [**37**, 494] of rye grass [*Lolium* sp.] was very prevalent and destructive, max. severity occurring at 95° F.; severity is not affected by soil pH within the range 4·5–7·6; seed treatments were unsuccessful; Bermuda grass [*Cynodon dactylon*] was affected by inoculation but not St. Augustine grass [*Stenotaphrum secundatum*] or zoysia grass [*Zoisia* sp.]. Cultural studies of the dollar spot fungus (*Sclerotinia homoeocarpa*) [**35**, 380] revealed that the strains in Florida were more tolerant of high temps. than those from Ohio and R. Is. Control of grey leaf-spot [*Piricularia oryzae*: **37**, 296] of St. Augustine grass was obtained by thiram,

kromad, chloranil, or captan at 3–4 oz. 1,000 sq. ft. applied at 8–10 day intervals.

A. A. Cook & C. W. Anderson state that bell-type pepper [*Capsicum* sp.] lines P11 and P34 were resistant to at least some strains of tobacco mosaic virus (TMV), tobacco etch virus (TEV), and potato virus Y. Resistance to both TEV and Y in both pepper lines has been ascribed tentatively, on the basis of inoculation of F_2 populations, to a single recessive factor in each, both possibly closely associated. TMV resistance in both lines results from a dominant gene, in at least the heterozygous condition, of a partial-dominance allelic series.

Bacterial spot [*Xanthomonas vesicatoria*: **37**, 702] on tomato and pepper [*Capsicum* sp.] was reduced by a $HgCl_2$ soak (1:1,000 for 10 min.) from an av. of 53 to to 3·1% in 1 experiment. Treating infected seed in hot water (50° C. for 30 min.) decreased the number of infected plants in 2 experiments from av. of 71·8 and 53 to 1·4 and 0·5%, respectively.

Choanephora sp. has been associated consistently with a new disease of *Crotalaria spectabilis* in nursery plots from irradiated seed. Affected parts turn black and the organism sporulates profusely on the surface.

From the Vegetable Crops Dept B. D. Thompson reports (pp. 170–171) that black spotting or black pit of packaged radishes [**35**, 256] was effectively controlled by a momentary post-harvest dip (within 7 hr.) in 50 or 100 p.p.m. oxytetracycline or 100 p.p.m. aureomycin. Sodium dehydroacetate, 0·75% as a 30 sec. dip, effectively controlled decay of strawberries caused by *Botrytis cinerea* and *Rhizopus* sp. [**38**, 93] when berries were held at 70° F. for 3 days or 40° for 4 days before keeping at 70° for 3 additional days; residue tolerances of 65 p.p.m. have been established. Oxytetracycline (100 or 200 p.p.m.) and streptomycin (200 p.p.m.) were effective when combined with 1% sodium orthophenylphenate in controlling [unspecified] fungal and bacterial decay of cantaloupes held 6 days at 60° F., but not longer. Some apparent phytotoxicity resulted from 1% sodium orthophenylphenate in intimate contact for more than the 5 min. dip period.

From the Central Florida Sta. (pp. 183–196) J. F. Darby states that *Cercospora apii* [**37**, 693] was the principal disease in celery. The following chemicals listed in decreasing order of effectiveness, provided statistically superior control and yield at 1% level: dyrene (2 lb.), maneb (1·5 lb.), nabam–$ZnSO_4$ (2 qt., 0·75 lb.), zineb (2 lb.), a mixture of maneb (1 lb.) –ferbam (1 lb.), phytoactin (100 p.p.m.), omadine Zn salt (2 lb.), and ziram (2 lb.). J. F. Darby & J. W. Wilson report that highly significant control (nearly double the yield of untreated plots) of both the small spot type of celery late blight (*Septoria apii-graveolentis*) [**33**, 575] and the large spot type (*S. apii*) [**37**, 693] were obtained with many of the chemicals listed above, and also ferbam (2 lb.), amobam [**38**, 704]–calcium hypochlorite (1 qt., 1 lb.), thiram 75 W.P. (1·5 lb.), and sodium dimethyl dithiocarbamate (Goodrich)–ferrous sulphate (1 qt., 1 lb.). Dilithium ethylene bisdithiocarbamate 34% (1 qt. 100 gal.) also gave excellent control of late blight.

At the Citrus Station (pp. 197–295) R. F. Suit & M. Cohen found that the 2 most effective spray treatments for melanose [*Diaporthe citri*: **35**, 511] on both grapefruit and oranges were 1st tribasic $CuSO_4$ (0·75 lb. 100 gal.), and 2nd a mixture of zineb (0·65 lb.) and tribasic $CuSO_4$ (0·75 lb.), 1 week post-bloom and 5 weeks later. Tribasic $CuSO_4$ was the best material tested on Temple oranges against citrus scab [*Elsinoe fawcettii*]. The percentages of fruit free from scab were: tribasic copper sulphate (0·8 lb. 100 gal.), 81·6; ferbam (1·52 lb.), 71·6; and thiram (1·3 lb.), 45·2. Cu-containing materials were found the most effective against brown rot [*Phytophthora* spp.].

Decay control research by E. F. Hopkins & A. A. McCornack (pp. 245–247) showed that the av. total loss in untreated check lots in 70 experiments for oranges held at 70° F. was 37·1% after 2 weeks and 55·1% after 3, compared with 11·9

and 20·6% in 1956–7. In 1957 degreened Hamlin oranges in the autumn developed about 10 times as much stem-end rot [*D. citri* and *Diplodia natalensis*] as in 1956. Decay records in Dec. and Jan. of this season showed that freezes markedly increased *Penicillium* mould decay. Experiments showed that stem-end peel breakdown [cf. **38**, 744] is increased by a high rate of transpiration from the fruit during degreening. This condition will also result from adverse colouring room conditions in the absence of ethylene gas, and with high stem-end peel breakdown there is more stem-end rot and mould [**37**, 701].

Diseases studied by L. C. Knorr & W. C. Price (p. 252) for possible relation to tristeza include: 'marasmus', a disease of Tahiti lime trees on rough lemon rootstocks that leads to the death of scion portions of affected trees but not of rootstocks; 'fuscous spot', a leaf disorder in Nagami kumquat, with symptoms ranging from chlorosis of tip leaves through patterns seen in leaves of psorosis-infected trees to lesions resembling greasy spot in mature leaves; 'veinal yellowing', a chlorosis in newly matured leaves of Tahiti lime; 'pinhead chlorosis', a punctiform spotting of sweet orange foliage; 'pebbly bark', a disease of a trifoliate hybrid tree, consisting of small massed blisters of bark that mantle the trunk and main branches; and 'satsuma pitting', an abnormal condition of the woody cylinder of satsuma orange resembling in some respects both stem pitting and xyloporosis pitting. Some success was obtained in reducing the period which most strains of Florida [citrus] tristeza virus [**36**, 317] take to show symptoms on Key lime by topping a test seedling to leave a bare stem, placing an infected bud immediately below each of 3–5 of the topmost remaining buds, and forcing these buds with $NaNO_3$ fertilizer. In 2 tests all of 12 plants showed indicative symptoms within 16–21 days. Attempts to transmit the virus to a large number of non-citrus spp. [listed] by using 2 dodder spp. were unsuccessful.

In screening tests by F[rancinia] E. Fisher of 23 compounds for combined control of citrus greasy spot [*Mycosphaerella* sp.: **37**, 478] and fruit [mite] russet zineb sprayed trees (1 lb./100 gal. rather than ½ lb.) yielded brighter fruit than any other material. In another area 10 yr.-old Thompson pink grapefruit were sprayed in July, and half of them again on 21 Aug., and assessed on a foliage density rating: tribasic $CuSO_4$ (0·53 lb. metallic Cu/100 gal.) and a mixture of tribasic Cu (0·53 lb.) and zineb (0·98 lb. active/100 gal.) were the most effective.

From the Everglades Sta. (pp. 260–306) F. E. Van Nostran reports that when conditions are favourable the dissemination of *Helminthosporium turcicum* [**37**, 701] spores from maize, as measured over 7 months from Nov. 1957, takes place between 9 a.m. and 4 p.m., with the max. at midday.

V. E. Green, J. D. Panzer, & J. R. Orsenigo, recording fungus diseases of rice [**37**, 583], suggest late Feb. or early July seedings as aids in maturing susceptible vars. early or late enough to escape *Piricularia oryzae*. Infection rarely occurred at 68° F. or lower [**37**, 352]. Identical yields were harvested from plots seeded at 22·5, 45, and 67·5 lb./acre, equal to ½, 1, and 1½ bush. seed/acre.

At the Gulf Coast Sta. (pp. 307–324) R. O. Magie, working on the control of *Fusarium* disease of gladiolus corms [**38**, 698], found that a 15 min. dip in elcide 70 [loc. cit.] at 3 pints/100 gal. gave larger plants than N.I. ceresan or panodrench, with little or no phytotoxicity. Of the new fungicides screened for controlling root rot (*Stromatinia* [*Sclerotinia*] *gladioli*) [**38**, 148] 200 lb. mylone/acre, mixed intimately with the soil, was better than 100 lb. Vapam at 36 gal./acre, injected to 5 in. and the soil surface sealed by sprinkling with water, was as effective as 100 lb. mylone with the soil sealed by pressing. A slightly acid 4–8–8 fertilizer applied at the time of treatment reduced the effectiveness of mylone. Approx. 24,000,000 gladioli were made unmarketable by *Botrytis gladiolorum* [**38**, 697].

At the Sub-tropical Sta. (pp. 351–371) L. A. McFadden found manzate to be the most effective of several fungicides tested against *Sphaceloma poinsettiae* [**21**, 455] on poinsettia (*Euphorbia pulcherrima*), followed by parzate and tribasic $CuSO_4$. The cause of a malformation of the growing point of poinsettia, with longitudinal streaks on the stem and spotting or blotching of the leaves, was unidentified, but may be bacterial. The possible virus nature of 'black splash' disease of *Hibiscus* [*H.* ? *rosa-sinensis*], responsible for stunted growth, chlorosis, and elongated black stem lesions, is being investigated by grafting.

G. D. Ruehle and T. W. Young, in an attempt to find a substitute for Cu fungicides for all or part of the spray programme for control of scab [*Sphaceloma perseae*: **35**, 683] and *Cercospora* spot [*C. purpurea*: **34**, 583] on Lula avocado pears, found that actidione S was very phytotoxic at 25 and 15 p.p.m. and prevented fruit set. Dyrene and thioneb failed to control scab effectively. Phaltan and thylate appeared to be rather promising for control of scab, but allowed considerable *Cercospora* spot.

Investigating control of potato seed piece decay and black leg [*Erwinia* spp.: **37**, 737: **38**, 245], G. D. Ruehle (p. 365) states that dipping the cut seed for 5 min. in a 1 p.p.m. solution of gibberellic acid caused early and uniform emergence of sprouts. Decreases in yield, significant at the 5% level, followed agrimycin 200 p.p.m. and terraclor 100 lb./acre+agrimycin 100 p.p.m.

R. A. Conover reports (p. 367) that in trials to control pole bean [*Phaseolus* sp.] rust (*Uromyces phaseolus typica*) [*U. appendiculatus*] with S or S+3·5% maneb dusts (the latter in general proving better), at 30–50 lb./acre depending on plant size, twice weekly applications were necessary with severe rust, and every 5 days with mild rust, but weekly applications were inadequate.

L. A. McFadden states that the physiological characteristics of the bacterium causing stem rot of *Dieffenbachia picta* and also spotting of young, but not older, leaves [**37**, 702] place it in *Erwinia* and it appears to be more closely related to *E. chrysanthemi* than to *E. carotovora*; it proved pathogenic only to *D. picta* and not to other aroids.

R. A. Conover reports that phaltan+ML 104 (chiefly due to the ML 104) was outstanding in control of downy mildew (*Pseudoperonospora cubensis*) on cantaloupe [**37**, 700] and equal to zineb. Sprayed plants did not deteriorate as rapidly following a 2-day 12 in. rain shortly before harvest. Powdery mildew (*Erysiphe cichoracearum*) [**36**, 806] on canteloupes appeared early and was quite severe. Compared with zineb, which gave fair control chiefly by delaying incidence, excellent control was obtained when karathane was added to every spray of zineb.

Sclerotinia sclerotiorum caused losses in chrysanthemum stock beds. In an unidentified, possibly bacterial, disease of Bluechip chrysanthemums observed during the rainy autumn and spring months, black or dark brown leaf spots appeared on mature leaves and sometimes advanced down the petiole and into the stem, causing blight. In dry weather the spots became brittle and fell away, leaving holes. Commercial plantings of *Chrysanthemum morifolium* were affected by petal spot (*Botrytis cinerea*), ray blight (*Ascochyta chrysanthemi*), bacterial blight (*Erwinia chrysanthemi*), and root and stem rot (*Pythium* sp.). Manzate gave good control of petal spot, and captan sprays proved highly effective against ray blight. Under conditions of high temp. and high humidity *E. chrysanthemi* may cause extensive damage but agrimycin 500 at 2 and 4 lb./100 gal. gave partial control and warrants further testing.

At the Potato Investigations Lab. (pp. 389–394) A. H. Eddins & D. L. Myhre observed that the vars. Boone, Delus, Plymouth, and Pungo and seedling selections B 294–65 and B 606–3, grown in soil infested by corky ringspot, showed no symptoms of the disease in 1958. Tuber infection in other selections and vars. ranged from 0·2 to 31·4% [**38**, 708, 764].

From the Strawberry Investigations Lab. (pp. 394–396) A. N. Brooks reports that during the summer of 1957 areas in 2 commercial strawberry fields were severely affected by *Sclerotium rolfsii*. Terraclor 75% wettable powder at 10 lb. 100 gal. and 34 lb./acre in the affected areas—a 20 ft. perimeter, despite rains every day for a week after, killed the fungus and many plants survived and grew normally.

At the Watermelon and Grape Investigations Lab. (pp. 396–398) N. C. Schenck observed that gummy stem blight (*Mycosphaerella citrullina*) [*M. melonis*: **37**, 69] was the most severe leaf spot disease of watermelons in 1958. Leaf spot (*Cercospora citrullina*) [loc. cit.] occurred late but was extensive on Charleston Gray. Watermelon seeds were internally infected by *M. melonis* after soaking 12 hr. in a conc. spore suspension. The amount of internal infection increased progressively with time. Infected seeds were completely freed from the fungus after soaking for 20 min. in water at 62° C., but germination was much reduced. Seed soaked in omadine 500 p.p.m. for 48 hr. was also almost completely rid of the fungus and germination was not affected.

Report of the Department of Scientific and Industrial Research, New Zealand, for the year ended 31 March 1959.—112 pp., 1959.

In a report [cf. **38**, 121] on virus diseases of fruit trees (pp. 19–20) apple mosaic [**38**, 12, 118] and plum mosaic [plum line pattern] viruses [**38**, 239] are stated to be the most common. The former is so widespread that it has not been possible to find mosaic-free trees of several popular vars. Although plum line pattern is not so severe it reduces tree growth and also yields for the 1st 3 yr. of cropping by half [**38**, 118]. There has been some success in the attempt to eradicate plum fruit crinkle virus [**38**, 413] and apricot Moorpark mottle virus [**33**, 734], as no further infected trees have been noted in the past 3 yr.

An aphid-borne disease of carrots identified as carrot motley dwarf virus [cf. **38**, 651] has recently been found and is widely distributed: it causes serious reduction of yield and quality of early crops. Yates' Top Weight and Sweetcrop (Homes' Improved Selection) are field resistant, while Chantenay, Early Nantes, Early Horn, and Manchester Table are susceptible.

The projects of the Plant Diseases Division are summarized by E. E. Chamberlain and the publications listed (pp. 80–84).

Clifton (C. E.), Raffel (S.), & Starr (M. P.) (Editors). **Annual review of microbiology. 13.**—553 pp., 7 fig., 3 graphs. Palo Alto, Calif., Annual Reviews, Inc., 1959. $7 (U.S.A.), $7.50 (elsewhere).

In this volume [cf. **38**, 121] E. C. Cantino & G. F. Turian (pp. 97–124: 118 ref.) review present knowledge of the physiological aspects of phylogenetic and ontogenetic development in aquatic, and, to a lesser extent, terrestrial Phycomycetes. H. L. Barnett (pp. 191–210: 118 ref.) reviews progress in the knowledge of disease resistance in plants, concluding that in future work the main effort should be directed towards determining the chemical and metabolic bases of resistance and their relationship to the genetics of host and parasite. M. P. Starr (pp. 211–238: 214 ref.), in a most useful survey of bacteria as plant pathogens, considers principally the systematics of the pathogenic spp. and the basis of their pathogenicity. An account by M. J. Fielding (pp. 239–254: 121 ref.) of nematodes in plant disease, includes reference to their occasional role in the transmission of soil-borne diseases caused by viruses, fungi, and bacteria. P. E. Hartman & S. H. Goodgal (pp. 465–504: 391 ref.) discuss bacterial genetics, with particular reference to genetic transfer.

Other papers of interest are 'Antibiotics in food preservation' by L. Farber (pp. 125–140; 171 ref.); 'Microbiological aspects of tissue culture' by H. E. Swim

(pp. 141–176: 336 ref.); 'Newer antibiotics' by W. F. Verwey (pp. 177–190: 109 ref.); and 'Biosynthesis of antibodies, facts and theories' by A. D. Bussard (pp. 279–296: 123 ref.).

Beaumont (A.). **Diseases of farm crops.**– 128 pp., 16 pl. (48 fig.), 15 fig., London, W. H. & L. Collingridge Ltd, 1959. 25*s*.

In this useful publication, following 2 general chapters on types of plant diseases and methods of disease control, a chapter is devoted to each group of crops in which diseases of individual crops (omitting certain specialized ones) are dealt with under the part of the plant affected. Symptoms and specific control measures are described.

Lur'e (A. B.). Лабораторно-практические занятия по сельскохозяйственным машинам. [Laboratory and practical operation of agricultural machines.]— 358 pp., 190 fig., Sel'khozgiz, Moscow–Leningrad, 1958. Roubles 5.85.

This manual gives a complete survey of the structure and use in theory and in practice of all kinds of machinery. In chapt. 3 (pp. 121–135) those used for the control of diseases and pests of crops are described in detail with emphasis on the most efficient and necessary machines, the most practical compounds to be used for specific purposes, and recommendations for the correct use of each appliance.

Mcshin (Rose), Naylor (Jill), & Lahovary (N.). **Studies on plant pathogenic bacteria. I. Cultural and biochemical characters. II. Serology.**—*Aust. J. biol. Sci.*, **12**, 3, pp. 223–232, 233–246, 1959. [45 ref.]

In studies at the Univ. Melbourne of 119 plant pathogenic bacterial strains (22 spp.), including organisms isolated in Australia and type cultures obtained elsewhere, the ability to liquefy a pectin medium was found to be correlated with ability to decompose plant tissues and was used for differentiating *Erwinia* spp. from the closely related coliform groups. Biochemical reactions showed great variation within spp. and appeared to be only of limited value in classification. The strains survived lyophilization for 2–5 yr.

From the serological work described it is concluded that diagnostic antisera can be useful for the identification of plant pathogenic bacteria, in epidemiological studies, and in screening isolates from plant pathogenicity tests. In the genus *Xanthomonas* treatment of the polysaccharide envelope of the bacterial cells with trypsin provided specific somatic antigens. This method suggests a promising line of investigation for further studies. *Corynebacterium flaccumfaciens* and *C. michiganense* appeared to be well-defined serologically and not related to 10 other *C.* spp. tested.

Goto (M.) & Okabe (N.). **Studies on the strains of Erwinia carotovora (Jones) Holland. III. Mucoid mutation. IV. Antigenic variations. V. Antigenic structures of soma, their relation to biochemical properties, and heat inactivation of agglutinins.** –*Rep. Fac. Agric. Shizouka Univ.*, **7**, pp. 1–10; 11–20, 1957; **8**, pp. 1–31, 1958. [Jap. Abs. from Engl. summ.]

In further studies [**37**, 757; **38**, 179] mutants of *E. carotovora* producing a dextran type polysaccharide capsule were found and are described. Polysaccharide production by the mucoid variant was affected by aeration and conc. of sucrose in the medium. The mucoid variant caused slimy rot of several vegetables including potato, onion, and radish within 24 hr.

In IV the somatic and flagellar antigens in *E. carotovora* are described and the type of variation they undergo in normal culture and on cultivation in the presence of antiserum to specific flagellar antigens. One isolate, which contained variants

forming 2 types of flagella, normal and curly, differing in amplitude, also contained a non-flagellated variant.

In V a technique for identifying *E. carotovora* and related bacteria by serological means is described. An attempt, successful in some cases, has been made to correlate biochemical groupings with serological type.

Sorokina (Mme T. A.). Приобретение патогенных свойств штаммами **Ps. fluorescens** в корневой системе Кок-сагыза. [The acquisition of pathogenic properties by strains of *Pseudomonas fluorescens* in the root system of Kok-saghyz.]—Труд. всес. Ин-та сел.-хоз. Микробиол. [*Trud. vses. In-ta sel.-khoz. Microbiol.*], *1958*, 15, pp. 287–292, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 16, p. 204, 1959.]

P. fluorescens [**37**, 707; **38**, 434] is the principal constituent of the microflora of the root system of kok-saghyz [*Taraxacum kok-saghyz*: cf. **36**, 606]. Numbers increase and reach 60–80% of the total of all micro-organisms at the end of the growing period. Strains isolated in the flowering period were pathogenic but not those isolated in the initial development period. By the end of the vegetative period pathogenic strains numbered 80–100% of those studied. It is suggested that the transition to pathogenicity is brought about by new soil and climatic conditions of cultivation and the absence from the roots of bacteria antagonistic to *P. fluorescens*.

Corberi (Elisa). **Azione inibente di estratto di Allium sativum L. sullo sviluppo di tumori da Agrobacterium tumefaciens (Smith e Town.) in Ricinus communis L.** [Inhibiting action of extract of garlic on the development of tumours of *A. tumefaciens* on *R. communis*.]—*Riv. Biol.*, **50**, 3, pp. 247–255, 3 fig., 1958. [Engl. summ. 24 ref.]

At the Istituto di Microbiologia Generale Agraria e Tecnica, Univ. Milan, inoculated plants were treated both locally and by root absorption with extracts of garlic, radish, and tulip, but only the garlic was effective. Brushing on a 1:3 dilution increased numbers of healthy plants from 3 to 69%.

Metcalf (R. L.) (Editor). **Advances in pest control research. Vol. II.** —426 pp., 67 fig., 37 graphs, New York & London, Interscience Publishers, 1958. $12.50.

The purpose of this series (Vol. I of which was published in 1957) is to reflect current trends in all fields of pest control research. Each vol. is to contain a number of papers, generally either review articles on progress in a particular field or critical evaluations of new concepts or developments. In Vol. **2** (with 8 papers) R. P. Frazer gives a detailed survey of the results and trends of modern research on 'The fluid kinetics of application of pesticidal chemicals' (pp. 1–106: 113 ref.); and S. E. A. McCallan & L. P. Miller review work on the 'Innate toxicity of fungicides' (pp. 107–134: 81 ref.) [**36**, 542; **37**, 70], covering metallic ions, S, organic toxicants, the permeability of spores and distribution of toxicants therein, the interpretation of dosage-response curves, and comparisons of the efficacy of fungicides with other biocides. Also of interest to plant pathologists is 'Research advances in seed and soil treatment with systemic and non-systemic insecticides' (48 pp.: 140 ref.) by H. T. Reynolds.

Laurent (J. E.). **Recherche d'une méthode d'étude du spectre des pulvérisations pesticides.** [A search for a method of studying the spectrum of pesticidal sprays.]—*Agron. trop., Paris* (formerly *Nogent*), **14**, 4, pp. 470–481, 5 fig., 6 graphs, 1959. [Engl., Span. summ.]

The results are presented of preliminary attempts in the Lake Chad area to devise an efficient method of studying the distribution of spray droplets in the field in place of the present method with glass slides put at various points in the crop. Squared cards of thick Bristol board, obtainable locally, were used, the aqueous spray mixture (insecticidal in this instance) being coloured with methylene blue. The cards are ruled in 0·5 cm. squares; strips 12 by 1·5 cm. are cut out and folded into the shape of a W. The central angle of the W is fastened over the branch of a cotton plant with the wings arranged horizontally, pieces being attached at 3 different heights. Each receiving surface bears a letter, thus, $\frac{b}{d}\,\frac{a}{}\diagup\diagdown\,\frac{c}{e}$, *a* and *b* being towards the operator. Rectangles 1·5 × 3 cm. are placed on the ground to study losses and may be fastened to both sides of the leaves. For a 1-lance spray the papers are placed along a single line or along 2 lines, the operator passing between. If an atomizer is used, they are placed at regular intervals in lines at right angles to the direction of the nozzle. The cards are examined with a lens and the number of coloured dots in a square in the centre of a receiving surface counted. Generally, it is sufficient to count the number of dots on surfaces *a* and *b*. A preliminary test indicated that a low jet at 20 cm. above the soil gave a better coverage, with certain reservations, of plants 55 cm. tall than a high jet. The performance of 4 atomizers was examined in detail with the following conclusions. Fontan (German) with less power and vol. (34 l. hr.) gave an av. volume of medium-sized spots; Kiekens (Dutch) was powerful (84 l. hr.) and gave the highest number of spots but this fell away with distance; Solo (German) was powerful, but for its vol. (54 l./hr.) coverage was feeble; Micronette (London) gave 12 l. hr., which resulted in levels regular over some distance, but few drops were recovered at heights under 1 m.

Kovàcs (A.) & Garavini (Carla). **Effetto stimolante di alcuni fungicidi organici.** [Stimulatory effect of some organic fungicides.] —*Ric. sci.*, **29**, 9, pp. 1913–1920, 3 fig., 1 graph, 1959. [Fr., Engl., Germ. summ.]

At the Istituto di Patologia Vegetale, Univ. Bologna, Italy, zineb, nirit, captan, ferbam, thiram, and $CuSO_4$ at low concs. in agar increased conidial germination of *Botrytis cinerea* over that of controls in distilled water. Conidia of *Cryptocline cyclaminis*, which failed to germinate in distilled water, did so in suspensions of thiazine (1·4–120 p.p.m.), manzate, coprantol, nirit, and SR 406. The germination rate was high in 0·5% malt solution but promycelial growth was stimulated by the addition of 40 or 120 p.p.m. thiazine, 12·5 p.p.m. manzate, or 0·8 p.p.m. nirit.

In agar diffusion tests with *Aspergillus niger* and *Saccharomyces carlsbergensis* both inhibition and stimulation zones developed round each of the fungicides, the latter being particularly conspicuous with pomarsol Z forte (containing ziram), narrower but clearly defined with manzate and thiazine, and larger and double but less prominent with pomarsol forte (containing thiram) and ferbam.

Owens (R. G.). **Plant disease control by 5-nitrofuran derivatives in relation to chemical structure.**

Owens (R. G.) & Novotny (Helen M.). **Influence of chemical structure of 5-nitrofuran derivatives on absorption by fungus spores and on inherent toxicity.** —*Contr. Boyce Thompson Inst.*, **20**, 2, pp. 141–149, 1 graph; pp. 151–165, 3 graphs, 1959.

In greenhouse tests on the control of early and late blight on Bonny Best tomatoes (*Alternaria solani* and *Phytophthora infestans*, respectively) [**37**, 330] and powdery mildew (*Erysiphe polygoni*) on Tendergreen bean (*Phaseolus vulgaris*) by 5-nitro-furans with substituents in the 2-position of the furan ring (all plus triton X-100 wetter), the ED_{95} values for the more active derivatives ranged from about

50 p.p.m. for 3-(5-nitro-2-furyl) acrolein to 250 p.p.m. for 1-(5-nitro-2 furyl)-2-nitroethylene. Compounds with alkylene groups in the 2-position were generally more active than derivatives with simpler substituents; the data indicated that substituents with a double bond or conjugated double bonds might be useful for improving the activity of other potentially effective fungicides. The second paper concerns the influence of substituents in the 2-position on absorption of 24 derivatives of 5-nitrofuran by conidia of *Neurospora sitophila*. The results indicate that it is not possible to predict foliage performance from uptake and inherent toxicity data, though this might serve as a guide to synthesis of new biocides.

Cantarelli (C.) & Tafuri (F.). **L'evoluzione dei residui di zineb nel processo di vinificazione.** [The development of zineb residues in the process of wine-making.]—*Ric. sci.*, **29**, 7, pp. 1416–1423, 1959. [Fr., Engl., Germ. summ. 18 ref.]

In comparative experiments near Perugia, Italy, the residues formed by ordinary and blue zineb, the latter containing 2·5% ferric ferrocyanide (Prussian blue), both applied at 300 g./l. water on fermented white grapes var. Trebbiano, did not exceed 1 p.p.m., mostly collected in the lees. The results of analysis of the volatile S products, CS_2, H_2S, and mercaptan, were within the normal limits for young wines, CS_2 being absent from the treated product.

Amsden (R. C.). **Aircraft in agriculture.** *ex* Proceedings of the eighth national power farming conference, Harrogate, 10–12 Feb., 1959, pp. 12–15, 1959.

The author, of Chesterford Park Res. Sta., Essex, reports on the rapid post-war development of aerial spraying in Great Britain, first introduced experimentally in 1947. In 1958 at least 100,000 acres of potatoes alone were sprayed from the air, as against 9,738 acres of all crops in 1950. Most of the work is done by a few substantial firms which employ their pilots all the year round on a variety of crops in different countries.

In general a good pilot needs a season's experience to become a good spray pilot. The work is very rapid, thus the total times required for spraying 10 acres, including take-off and landing, for the Percival E.P. 19, the Tiger Moth, and the Hiller 12A, are 21·7, 14·6, and 10·3 min., respectively. It is frequently advantageous to use a reasonably coarse spray in a cross-wind of at least 5 m.p.h., but cross-winds in excess of 12–15 m.p.h. are generally too strong both from a flying point of view and because of drift. Ground organization, including care of aircraft, refuelling, preparation of sprays, and checking the sprayers for blockage, requires a high standard of team work, and for each man flying 2 men are needed on the ground.

Contract prices are generally 50% higher than for ground spraying; charges are usually made on a sliding scale such that areas of under 10 acres may cost about 20% more than areas over 200 acres, but reductions may be made where 2–3 treatments are necessary. The advantages of the method over ground spraying usually compensate for the higher price.

A condensed version of this interesting paper appears in *Agric. Chem.*, **14**, 8, pp. 59, 95, 97, 1959.

Mayer (K.). **4,500 Jahre Pflanzenschutz.** [4,500 years of plant protection.] 45 pp., 5 fig., Stuttgart, Verlag Eugen Ulmer, 1959. DM 6.20. [153 ref.]

Historical references to plant pathology are listed in chronological order, including a selection of some of the more outstanding developments of recent years. On pp. 34–38 are presented brief biographical data on a number of prominent figures in plant pathology.

Buchwald (N. F.). **Plantepatologi. Plantepatologisk Afdeling 1909–1958.** [Plant pathology. Phytopathological Department 1909-1958.] — *Jubilaeumsskr. Vet.-LandbHøgsk. Kbh., 1958*, pp. 147–155, 1 fig., 1958.

Landmarks in the history of Danish plant pathology associated with the names, e.g., of E. Rostrup, F. Kølpin Ravn, C. C. F. Ferdinandsen, and the author.

Van Beverwijk (Agathe L.). **The Centraalbureau voor Schimmelcultures. Half a century's experience with mould cultures.** — *Leeuwenhoek J. Microbiol. Serol.*, **25**, 1, pp. 1–20, 1 fig., 1 map, 1959.

A short account of the history and working of the Bureau [cf. **37**, p. 24] and its relation to research, phytopathology, medical mycology, and industrial mycology.

Zhukovskiĭ (P. M.). Взаимоотношения между хозяином и грибным паразитом на их родине и вне её. [Interrelation between host and fungal parasites in their country of origin and out of it.] — *J. agric. Sci. Moscow*, **4**, 6, pp. 25–34, 1959. [Eng., Germ., Fr. summ.]

The author, Director of the Inst. Pl. Industr., Moscow, regards field resistance of a plant to all physiological races of a pathogen in its country of origin, which is the same as that of the parasite, as the supreme expression of genotypical immunity developed during centuries. Such centres provide invaluable material for breeding. Such genotypes, e.g. *Triticum timopheevi* from the Caucasus, highly resistant to *Puccinia triticina* [*P. recondita*], are highly resistant when introduced in different geographical localities where virulent races of mutergenic origin are not present but they may become susceptible if introduced into an area where a secondary centre of parasitic evolution has developed. When a parasite is introduced to an entirely new geographical region, as was done with *Phytophthora infestans*, where it finds new susceptible hosts, an epiphytotic always occurs. Then only resistant hosts from the original country can successfully control the disease. Hybrids produced away from the country of origin of the parasite, though resistant in the region of their creation, may prove very highly susceptible elsewhere. Studies of geographical races of parasites are essential for breeding programmes.

Sreeramulu (T.). **The diurnal and seasonal periodicity of spores of certain plant pathogens in the air.** — *Trans. Brit. mycol. Soc.*, **42**, 2, pp. 177–184, 5 graphs, 1959. [20 ref.]

Further information is given on the diurnal and seasonal periodicities of 15 spore types from plant pathogenic fungi studied during June–Sept. 1953 in an open field at Rothamsted exp. Sta. [**37**, 10], using a Hirst spore trap 2 m. above ground [cf. **38**, 182]. Early in the season spores of *Ustilago* and *Erysiphe* were present in large numbers and those of *Botrytis* and *Periconia* reached their peak. Uredospores of rusts and spores of *Helminthosporium* reached their max. in the middle of the season, while *Polythrincium ? trifolii* and *Epicoccum* occurred in large numbers towards the end. *Alternaria* and *Stemphylium* spores were detected from the middle until the end of the season, and appreciable numbers of spores of *Tilletia*, probably liberated during threshing, also appeared towards the end; *Ganoderma* spores were present throughout, while *Coniophora* spores occurred for a very short time only. In dry weather many fungi showed typical diurnal periodicity: *Ustilago*, *Helminthosporium*, uredospores, *Botrytis*, *Alternaria*, *Stemphylium*, and *Periconia* were most abundant in the afternoon and least in the early morning. *Erysiphe*, *Polythrincium*, and *Epicoccum* also occurred during daytime, but reached their max. before noon. The greatest conc. of spores of *Ganoderma*, *Coniophora*, and other coloured basidiospores were between midnight and dawn. The findings appear to be representative of large rural inland agricultural areas in temperate regions.

Davies (R. R.). **Detachment of conidia by cloud droplets.** –*Nature, Lond.*, **183**, 4676, p. 1695, 1959.

At St. Thomas's Hospital Medical Sch., London, when a Petri dish of nutrient agar was held behind a culture of *Verticillium alboatrum* so that it received some of the water droplets sprayed on to the colony from an atomizer, a number of colonies of *V. alboatrum* subsequently developed on the new plate, but none when only puffs of air without water droplets were directed on to the fungus. Pieces of grass culm and cotton thread soaked in agar, inoculated with dense spore suspensions of mould fungi, were incubated at 100% R.H. until conidiophores developed. The cultures were then placed in air streams into which a continuous stream of water droplets (8–210 μ diam., modal diam. 78 μ) could be introduced. The results for *Cladosporium* show that much larger numbers of spores are detached by air currents containing water droplets than by those of the same velocity without droplets, 32,000/min. being caught in a 10 m. sec. air stream—droplets in contrast to 4,000 without.

Hilditch (E. A.). **Copper 8-hydroxyquinolate-application as a textile preservative.** —*Industr. Text.*, **4**, 2, pp. 17–20, 2 fig., 2 graphs, 1959. [31 ref.]

An up-to-date review of information on fungicidal properties, methods of application, rot-proofing efficiency, and weather resistance.

Baldacci (E.) & Ceccarelli (V.). **L'inquinamento atmosferico e le piante.** [Atmospheric pollution and plants.]—*Chim. e. Industr.*, **40**, pp. 274–281, 1958. [Fr., Engl., Germ. summ. 19 ref.]

The 1st part of this paper concerns the reported use of various plant spp. as indicators of atmospheric pollution. The 2nd part gives analytical data on the sensitivity of 43 spp. of woody plants and 41 weeds growing in Italy to S, Cl, F, and N (oxide and NH_3) [cf. **31**, 419; **35**, 913; **38**, 130, 491].

Apparao (A.). **Iron-copper antagonism and growth of Piricularia oryzae.**—*Curr. Sci.*, **28**, 8, pp. 336–337, 1959.

Further investigations at the Univ. Bot. Lab., Madras [**35**, 386], revealed antagonism, additive effects, and interaction in the uptake of Fe, Zn, Mn, and Cu by *P. oryzae*. The ionic toxicity of Cu and the interaction of the other metals in counteracting it were studied by inducing toxicity in an otherwise complete medium by adding 110 μg. Cu/20 ml. medium; Cu toxicity was counteracted with the same amount of Fe, Zn, or Mn, alone or in combination.

Cu was toxic even in the presence of the other elements, though Fe and to a much lesser extent Mn effectively antagonized it, whereas Zn appeared to exert an additive effect. Zn or Mn or both reduced the Fe-Cu antagonism. The effect of this antagonism on the growth of fungi has not hitherto been noticed, though it affects penicillin production by *Penicillium chrysogenum* [**26**, 311].

Tinline (R. D.) & Samborski (D. J.). **Cochliobolus sativus. II. Photo-activated pigmentation.**—*Mycologia*, **51**, 1, pp. 77–88, 7 graphs, 1959.

In further studies [**38**, 354] an unidentified pink pigment ('sativin') was obtained from the mycelium of all strains grown in the light. It could be seen only in white-spored lines as the dark spores masked the colour. It is water-insoluble, and a pH indicator, with an end-point about 8·6, above or below which it is blue or pink. Only light of 390–513 mμ stimulated pigment production, which was an oxidative process. The fungus grew well on ammonium N but did not form pigment, whereas on nitrate N growth was moderate but pigment abundant. Media containing

glucose and nitrate N, alanine, L-asparagine, L-argenine, glycine, or L-proline appeared most favourable to both growth and pigmentation. Other *H.* spp. (22 tested) produced similar pigments.

ITAHASHI (MICHIKO). **Choline sulfate ester as sulfur source for the growth of fungi.** —*Bot. Mag., Tokyo*, **72**. 853–854, pp. 275–282, 1959. [Jap. summ.]

Study of 29 spp. at the Aichi Gakugei Univ., Higashi-Ku, Nagaya, showed that the ester of choline sulphate was used by Aspergillales, Pyrenomycetes, and Fungi imperfecti as a S source; in some cultures of *Alternaria tenuis* an accumulation of S ions was detected in the residual medium. Yeasts except *Hansenula anomola*, and Mucorales, except *Rhizopus oryzae*, failed to utilize it. Although no appreciable utilization of the ester was noted among Basidiomycetes, it enhanced their growth.

CURL (E. A.). **Microorganisms isolated from sclerotia of Sclerotium rolfsii and their antagonistic effects upon the pathogen.**—Abs. in *J. Ala Acad. Sci.*, **30**, 2, pp. 3–4, 1958.

At the Polytechnic Inst., Auburn, Ala., in 1957, 35 spp. of fungi, 13 of bacteria, and 15 of streptomycetes were isolated from sclerotia of *S. rolfsii*. *Sclerotinia* sp. was isolated only from crushed sclerotial suspensions, while the others were also obtained from surface washings. Tested on Czapek-Dox agar, 35% of the fungi, 33% of the bacteria, and 21% of the streptomycetes were more or less antagonistic to *Sclerotium rolfsii* [cf. **38**, 752], which in turn suppressed the growth of 5 fungi. Several [unspecified] isolates from each group either stimulated or inhibited sclerotial production.

PROTSENKO (E. P.), KUCHAEVA (Mme A. G.), & CHELŸSHKINA (Mme T. A.). Антибиотики в борьбе с мучнистой росой. [Antibiotics in the control of powdery mildew.]—Бюлл. главн. бот. Сада [*Bull. centr. bot. Gdn, Moscow*], *1959*, 35, pp. 78–82, 1959.

At the Central bot. Garden preparation 1609 (formerly 'virusin 1609'), obtained from *Actinomyces griseus*, was tested for antibiotic properties against oidia of powdery mildew [*Sphaerotheca pannosa*: cf. **38**, 211] on *Rosa canina* and of *Oidium erysiphoides* [*Erysiphe cichoracearum*: cf. **38**, 237] on cucumber. Slight burn occurred at 1:1,000. The protective action lasted about 10–12 days, but new leaves developing on infected plants were infected. Against *S. pannosa* on *R. canina*, 1609 (1 g./l. water—spreader OP 7 at 1 ml./l. water) gave (3 repetitions) an av. 15% healthy plants in the 3rd. repetition in contrast to 13% with $CuSO_4$+OP 7, and 7% with $CuSO_4$—soap. Its action on *S. pannosa* is close to that of the $CuSO_4$+soap, though it is easier to use. When 1609 (1:1,000 without spreader) was sprayed on infected indoor cucumber plants at the 2 leaf stage only slightly evident spots developed, whereas the whole leaf lamina of unsprayed plants was infected.

GURINOVICH (E. S.). Применение микробов-антагонистов при яровизации семян Люпинов и Гречихи для борьбы с плесенями. [The use of microbe-antagonists in the vernalization of Lupin and Buckwheat seeds for the control of moulds.]—Сборн. науч. Труд. Акад. сел.-хоз. Наук Белорусс. ССР. [*Sborn. nauch. Trud. Akad. sel.-khoz. Nauk Beloruss. S.S.R.*], *1958*, 5, pp. 335–345, 3 fig., 1958. [Received Oct. 1959.]

In vernalization tests at the agric. Inst., Minsk, B.S.S.R., suspensions of 4 strains isolated from Poles'ya soil, P65, P66, P19, and P51, and 1 from the Drissenski region, Dr 47, added to seed of low germinability, completely depressed the development of *Aspergillus* sp., *Penicillium* sp., and *Mucor* sp., which usually developed rapidly during vernalization. *Trichoderma* sp. (4 strains, 7-day cultures) stimulated the development of the moulds, while 2 strains of *B. pyocyaneum* [*Bacillus*

pyocyaneus] had no effect. The yield from buckwheat seeds treated with the 5 favorable strains was increased by 2–6%. The best result with both seed species was obtained with 3-day-old cultures of Dr 51, Dr 47, Dr 64, 7-day-old of P65, Ts, Dr 64, 5-day-old of actinomycetes (P20, P16, P66), and 10-day-old Tts and P20. This method is promising for general use.

Naito (N.) & Tani (T.). **Antibiotic production induced by 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and 2-methyl-4-chlorophenoxyacetic acid (MCP) in Gloeosporium olivarum causing Olive anthracnose.**—*Kagawa Daigaku Nôgakubu Gakuzyutu Hokoku*, **8**, pp. 157–167, 1957. [*Chem. Abstr.*, **53**, 15, col. 14217f, 1959.]

At Kagawa Univ., Japan, *G. olivarum* [**35**, 916 and below] was grown on media supplemented by various concs. of 2,4,5-T, MCP, isopropyl-(3-chlorophenyl) carbamate, pentachlorophenol, and K1-naphthaleneacetate (NAK). Direct contact between 2 colonies occurred in agar cultures with or without 0·03% NAK, but there was an inhibition zone with 0·006% 2,4,5-T or 0·015%MCP. From culture filtrates of the latter 2 a crude antibiotic of yellowish oil was obtained; that from MCP could be purified into white needle crystals, which were thermostable and virtually insoluble in cold water but soluble in hot water and organic solvents. The growth of *G. olivarum*, *Cochliobolus miyabeanus*, and *Corticium centrifugum* was inhibited by the antibiotic at dilutions of 40,000, 10,000, and 30,000, respectively.

Naito (N.) & Kojima (Y.). **Fungitoxic substance production by Gloeosporium olivarum which was grown on media containing 2-chlorophenoxyacetic acid or 2-methylphenoxyacetic acid.**—*Kagawa Daigaku Nôgakubu Gakuzyutu Hokoku*, **9**, pp. 18–25, 1958. [Jap., with Engl. summ. *Chem. Abstr.*, **53**, 15, col. 14217i, 1959.]

The growth curve of *G. olivarum* cultured for 17 days at 25° C. on peptone-salts-agar containing CPA or MPA [see above and below] was convex upwards with a progressive decrease in rate with an increase in the inhibitory activity of each compound, but on media containing 2-methyl-phenol (MP). 2-chlorophenol (CP), or 2-dichlorophenol (DCP) the curve was concave upwards. The margin of colonies on media supplemented by CPA or MPA changed from circular to wavy and irregular, and the mycelial mat plus agar became raised, leaving a gap between it and the bottom of the dish. Such changes did not occur with MP, CP, or DCP. A crude, yellowish, fungitoxic oil was isolated from the culture filtrates on liquid media containing CP or MPA.

Naito (N.), Tani (T.), & Kishi (T.). **Antifungal substance production by Gloeosporium kaki and Schizophyllum commune which were grown on media containing 2,4-dichlorophenoxyacetate (2,4-D).**—*Kagawa Daigaku Nôgakubu Gakuzyutu Hokoku*, **9**, pp. 60–72, 1958. [*Chem. Abstr.*, **53**, 15, col. 14218c, 1959.]

The growth curves of *G. kaki*, *S. commune*, and *Helminthosporium sigmoideum* on peptone-salts agar containing 2,4-D were convex upwards [cf. above], while that of *Cochliobolus miyabeanus* was linear during a 12–14 day incubation period at 25° C. Filtrates of the 2 1st-named spp. on 2,4-D-containing media yielded a crude, yellowish, fungitoxic oil.

Papavizas (G. C.) & Davey (C. B.). **Evaluation of various media and antimicrobial agents for isolation of soil fungi.**—*Soil Sci.*, **88**, 2, pp. 112–117, 1959. [19 ref.]

Of 41 media tested at the Plant Industry Sta., Beltsville, Md, modified Warcup's medium [**35**, 326], dextrose-peptone-yeast-extract agar, V-8 juice-dextrose-yeast-

extract agar [cf. **35**, 35 *et passim*], and the last-named+2 g. peptone/l. were the most effective in the isolation of a max. number of [unspecified] fungi from soil. Besides the main ingredients all these media contain chlortetracycline and streptomycin, oxgall [**33**, 380 *et passim*], and Na propionate or Na desoxycholate [**35**, 312]. Satisfactory results were also obtained with Ohio medium [**35**, 860], modified Martin's [**29**, 433], and modified Raper's (*Amer. J. Bot.*, **41**, 69–86, 1954) media. Dextrose-peptone and V-8 juice-dextrose-yeast-extract agars permitted the identification of an appreciably larger number of genera than the other media tested.

Oxgall (0·25–0·5% of the medium) was most effective in reducing the spread of rapidly growing organisms and in promoting the development of numerous colonies/plate, without significantly diminishing sporulation, while various combinations of oxgall, rose bengal [**38**, 576], Na desoxycholate, and Na propionate gave similar results.

WENT (JOHANNA C.). **Cellophane as a medium to study the cellulose decomposition in forest soils.**—*Acta bot. neerl.*, **8**, 4, pp. 490–491, 1959.

In preliminary work at the Central Laboratorium, Delft, non-twisted cellulose threads were used because they were more readily cleaned after removal from the soil than twisted ones (cf. Van Goor, *T.N.O. Nieuws*, **7**, p. 11, 1952). As for various reasons decline in wt. did not give reproducible results the criterion finally accepted for the rate of decomposition was the time taken for the disappearance of the threads [cf. Tribe, **37**, 703]. As it was not possible to recognize directly the fungi growing on the cellophane, they were isolated and their growth studied on cellophane on an agar layer containing only inorganic salts. Cultured in this way a tropical isolate of *Staphylotrichum* (cf. Nicot & Meyer, *Bull. Soc. mycol. Fr.*, **72**, p. 4, 1956) formed a fan-shaped growth closely similar to that of *Rhizophlyctis*, an example of the confusing effect of growth on cellophane. Isolates of *Staphylotrichum* and *Myrothecium* from Hackforth oak forest soil (sandy loam) took 3·5 and 7·5 weeks, respectively, to digest the cellophane at 10° C. The slower disappearance of the cellophane in forest soils than in pure culture is evidence of microbial antagonism and other environmental influences in the soil. In 1953 square plots in a pine forest on sandy soil were dug down to 20 cm. and left untreated or dressed with either ground lime marl (2,000 kg./ha) or hydrated lime (1,950 kg./ha). Six years later there are still marked differences in the cellulolytic activity of the plots, there being 'little or no disappearance' in the limed plot in 18·5 weeks compared with some breakdown after 11 weeks and appreciable breakdown after 14·5 weeks in the untreated plot. In the marled plot breakdown after 14·5 weeks was even more marked than in the untreated.

DUDA (J.). **Wpływ środków owadobójczych HCH i chlordanu na mikroflorę głęby.** [Effect of the insecticidal preparations HCH and chlordane on the soil microflora.]—*Acta microbiol. polon.*, **7**, 3, pp. 237–244, 1958. [Engl. summ.]

In pot experiments at the Sch. Agric., Poznań, Poland, neither BHC nor chlordane at 0·05–1 g./kg. soil inhibited the growth of bacteria, actinomycetes, or fungi during incubation periods of up to 30 days. On an agar medium the growth of *Mucor* sp., *Aspergillus niger*, and *Penicillium* sp. was slightly impeded by the 0·5 and 1 g. concs.

MIRCHINK (T. G.) & ASEEVA (Mme I. V.). Грибы как фактор токсичности дерново-подзолистой почвы различной степени окультуренности. [Fungi as a toxicity factor of turf-podzol soil at different degrees of cultivation.]—Науч. Докл.

высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Ser. biol. Sci., *1959*, 2, pp. 206–211, 3 fig., 1959.

Of 4 types of soil examined at the Agrobiological Sta., Moscow Univ., those slightly cultivated (natural soil and with added N) contained the most fungi. Culture filtrates from 9 predominant fungi were tested for toxicity to wheat seed: *Penicillium cyclopium* and *P. purpurogenum* completely inhibited germination and *P. nigricans* and *P. janthinellum* retarded growth. Sterile soils with organic supplements (sucrose or compost) inoculated with toxic strains of the fungi depressed seed germination compared with soil without added fungi.

Reddy (G. R.) & Mehta (B. V.). **Molybdenum deficiency symptoms in some common crops of Gujarat.**—*Vidya* (*J. Gujarat Univ. Sci.*), **2**, 2, pp. 92–99, 1958. [*Chem. Abstr.*, **53**, 17, col. 15436b, 1959.]

At the Inst. Agric., Anand, India, the leaves of Mo-deficient tobacco developed small, necrotic areas, followed later by chlorosis and bleaching. The principal symptoms in blue panic grass [*Panicum* sp.] are a yellowish-green discoloration with brown tips and spots covering the entire leaf surface. Rice reacts by slight interveinal chlorosis in the middle of the upper and middle leaves. In beans [*Phaseolus vulgaris*] large, white, scorched areas develop between the veins of the upper leaves.

Williams (C. N.). **Spore size in relation to culture conditions.**—*Trans. Brit. mycol. Soc.*, **42**, 2, pp. 213–222, 8 graphs, 1959.

At Birkbeck Coll., Univ. London, the spores of *Mucor dispersus*, *Trichothecium roseum* [**35**, 214], *Sordaria fimicola*, and *Coprinus heptemerus* were larger when formed in the dark (or with 60 f.c. illumination in *C. heptemerus*) than in light (120 f.c. 'daylight' fluorescent). *S. fimicola* produced larger spores at higher temps., the others smaller. *M. dispersus* and *C. heptemerus* produced larger spores at acid pH, and *T. roseum* at the more alkaline; the min. for *S. fimicola* was at pH 6·4. In media containing glucose+cellulose *S. fimicola* produced smaller spores than with cellulose as the only carbohydrate source. *M. dispersus* and *C. heptemerus* produced bigger (over 3 μ for the former) spores with increasing sugar conc.; in *M. dispersus* this was unaffected by organic N (asparagine) conc., but decreased in *C. heptemerus* at higher N (yeast) conc. Conidia of *T. roseum* on glucose/asparagine media with 0·05% asparagine did not increase in size with increasing sugar conc., but with 0·2–1% asparagine a sharp increase (about 3·5 μ) occurred between 2 and 5% glucose. Using $(NH_4)_2SO_4$ and KNO_3 instead of asparagine, at similar low and high conc. there was a regular increase in conidium size with increasing glucose at both levels. Therefore, spore size should be used to characterize spp. only under completely standard conditions.

Negru (A.). Новые и редкие виды грибов Румынской Народной Республики. [New and rare species of fungi from the Romanian People's Republic.] –*Bot. Mater.* (*Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), **12**, pp. 213–224, 1959.

The author presents a further list [cf. **38**, 579] of 43 spp. *Phoma ocimi* on the stalks and branches of basil (*Ocimum basilicum*) is new. Also included are *Cylindrosporium padi* [cf. **37**, 727] on the leaves of wild cherry (*Cerasus* [*Prunus*] *avium*), *Fusicladium* [*pirina* var.] *pyracanthae* [cf. **37**, 45] on the leaves and fruit of *Crataegus pyracantha* [*Pyracantha coccinea*], and *Alternaria brassicae* [cf. **37**, 612] on the leaves of *Lunaria annua* and *L. rediviva*, which are new host records.

Nelen (E. S.) & Vasil'eva (Mme L. N.). Патогенная микофлора цветочных растений в Дальневосточном Ботаническом Саду. [The pathogenic fungus

flora of the flowering plants in the Far-East Botanical Garden.]—Бюлл. главн. бот. Сада. [*Bull. centr. bot. Gdn, Moscow*], *1959*, 35, pp. 82–91, 1959.

During 1952–57 78 spp. of fungi (21 spp. of *Septoria*) were identified on 49 plant vars. in the Garden. Of these, 70 spp. were first occurrences for Primor'e, and 5 spp. new to science. A detailed list is given, including *Alternaria leucanthemi* Nelen on *Leucanthemum vulgare* and annual sunflower, *A. rudbeckiae* Nelen on *Rudbeckia hirta*, *Macrosporium calendulae* Nelen on *Calendula officinalis*, *A. florigenum* comb. nov. (syn. *M. florigenum*) on China aster and *Aster alpinus*, *Alternaria carthami* on safflower, and *Puccinia menthae* on *Mentha dahurica* [map 211].

Lebezhinskaya (Mme L. D.). Новые виды меланкониальных грибов Ленинградской области на плодово-ягодных растениях. [New species of melanconial fungi of the Leningrad region on berry-fruit plants.] —*Bot. Mater.* (*Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), **12**, pp. 268–270, 1 fig., 1959.

The 4 spp. described were collected in 1953–55. They include *Melanconium mali* on apple branches, *Monochaetia rubi* on raspberry stems, and *Kabatiella nigricola* on the tips of thin twigs of black currant.

Jiang (G.-Z.). **Graminicolous species of Helminthosporium from China.**—*Acta phytopath. sinica*, **5**, 1, pp. 22–34, 3 pl. (22 fig.), 1959. [Chinese. Abs. from Engl. summ.]

The morphology and distribution of 22 *Helminthosporium* spp. [cf. **38**, 9] are reported; they include *H. turcicum*, *H. oryzae* [*Cochliobolus miyabeanus*], *H. sacchari*, *H. maydis* [*C. heterostrophus*], *H. carbonum*, *H. setariae* [**37**, 442], *H. rostratum*, *H. gramineum*, *H.* [*Pyrenophora*] *teres*, and *H.* [*Pyrenophora*] *tritici-repentis*. Of the total number, 7 are new records for China, including *H. rostratum* and *P. tritici-repentis*.

Obrist (W.). **Untersuchungen über einige 'dothideale' Gattungen.** [Studies on some 'dothideaceous' genera.]—*Phytopath. Z.*, **35**, 4, pp. 357–388, 21 fig., 2 graphs, 1959. [Engl. summ. 41 ref.]

Detailed morphological, cultural, ecological, and cytological studies were made at the Eidg. Tech. Hochschule, Zürich, Switzerland, on the type spp. of 6 genera of the Dothideales *sensu* Theissen & Sydow [**37**, 215], including *Scirrhia*. Two new spp. are described and 1 is redisposed.

Cherepanova (Mme N. P.). Об изменчивости морфологических структур у **Diaporthe strumella (Fr.) Winter.** [On the mutability of morphological structures in *D. strumella*.] *Bot. Mater.* (*Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), **12**, pp. 172–182, 6 fig., 1959.

D. strumella was studied experimentally and in nature. By artificial inoculation of sterile branches, as well as on *Ribes*, it was shown to develop well on other plants: *Quercus*, *Sorbus*, *Artemisia*, *Lonicera*, *Spiraea*, *Syringa*, and *Melilotus*. *D. leiphaemia* on *Quercus*, *D. sorbicola* and *D. patria* on *Sorbus*, and *D. salicella* on *Salix* were analogous morphologically to *D. strumella* growing on the same substrata. In natural conditions *D. strumella* produced, besides the typical valsoid stroma, a prostrate stroma of the diatrypoid type; thus, the former, considered an important diagnostic character, is not a constant hereditary feature, being at times absent in natural and experimental conditions. It is the most significant character of the genus *Chorostate* Naumov (1954), so that further study of representatives of this genus is required for the purpose of determining the diagnostic significance of their morphology. From the author's point of view, the form and arrangement of the ascospores, the number of cross-walls, form, absence of colour, and dimensions can provide a sure indication of this genus.

Gerlach (W.). **Beiträge zur Kenntnisse der Gattung Cylindrocarpon Wr. III. Cylindrocarpon olidum Wr. und seine phytopathologische Bedeutung.** [Contributions to the knowledge of the genus *Cylindrocarpon*. III. *C. olidum* and its phytopathological significance.] —*Phytopath. Z.*, **35**, 4, pp. 333–346, 8 fig., 1959. [Engl. summ.]

Further work at the Institut für Mykologie, Berlin-Dahlem, in this series [cf. **35**, 768] is reported. In a rather severe attack of foot rot in nursery plants of *Epiphyllum truncatum* in Berlin the losses were apparently occasioned primarily by a *Fusarium* of the *Elegans* group, but from many of the lesions a *Cylindrocarpon*, closely related to *C. olidum* was often isolated. This was compared with other strains of the sp. and with *C. o.* var. *suaveolens*. It differed from the type in the broader conidia (av. 55·71·4 × 8–8·4 μ) and a new var. is named *C. olidum* Wr. var. *crassum* Gerlach.

Agarwal (G. P.) & Bhave (Miss V.). **Ageratum conyzoides Linn., a new host for Alternaria zinniae Pape.**—*Curr. Sci.*, **28**, 7, pp. 292–293, 1 fig., 1959.

This is reported from Mahakoshal Mahavidyalaya, Jubbulpore, India.

Johnston (T. W.) & Gold (H. S.). **A system for continual-flow sea-water cultures.** —*Mycologia*, **51**, 1, pp. 89–94, 1 fig., 1959.

This apparatus, devised at Duke Univ., Durham, N. Carol., provides for circulation of raw, filter-sterilized, or autoclaved sea-water over test wood and cordage samples inoculated with lignicolous marine fungi [**38**, 634]. The basic features are the reservoir (a 3½ gal. pyrex carboy), the growth-cylinders (1 $\frac{13}{16}$ in. (i.d.) pyrex glass tubes 8 in. long), a variable-speed Sigmamotor water-pump (in which the sea-water does not contact the metal) with a Zero-Max speed changer (Sigmamotor, Inc., Middleport, N.Y.), and a Marco air-pump (J. B. Maris Co., Bloomfield, N.J.) if needed. Six growth-cylinders may be connected in series. Connexion between the various parts of the circulating system is by means of tygon tubing and pyrex glass-tubing. Inoculation of the wood blocks or rope sections in the growth chambers is effected either directly or by injecting a spore suspension into the flowing water. After sterilization of separate components before assembly no bacterial or fungal contamination was detected even after 3 months' operation.

With 2 marine fungi tested extensively it was ascertained that the depth of mycelial penetration of wood blocks of 6 spp. by *Helicoma macrocephala* was much less than that of *Ceriosporopsis halima*, though the former induced a visible softening of the outer wood surfaces and the latter did not.

Claus (D.). **Polyurethan-Schaumstoffe zum infektionssicheren Verschluß von Kulturgefäßen.** [Polyurethane foam materials for the infection-free closure of culture vessels.]—*Naturwissenschaften*, **46**, 18, p. 536, 1959.

Very satisfactory results have been obtained in the culture of yeasts, fungi, and bacteria at the Institut für Mikrobiologie, Univ. Göttingen, Germany, from the use of Porella foam, supplied by Correcta-Werke, Bad Wildungen, in a diam. range of 2–100 mm. (5–10 mm. in the medium-sized pore type 35 is adequate under normal conditions). The material is resistant to dilute acids and leaching and can be boiled and sterilized. More than 100 round or square stoppers for flask sizes 200–100 ml. can be cut from 1 sq. m., the cost of a single stopper working out at Dpf. 3–6.

Streshinskiĭ (M. O.). К методике продолжительного визуального наблюдения за бактериальной культурой. [A method for the prolonged visual observation of bacterial cultures.] —*Microbiology, Moscow*, **27**, 2, pp. 250–252, 1 fig., 1958.

The method devised by Fonbrün (P. Fonbrün, Izd.-vo IL, 1951) is modified to make possible the changing of the nutrient medium at any time during an experiment or

to manipulate the growing cells as desired. The experimental material is isolated, the cells being dabbed on to a sterile cover slip in a water suspension, or a few flat drops are placed on it. After drying a while, the glass is dabbed down on to the surface of a membrane (1–1·5% solution of cellulose in amyl acetate). If the edge of the membrane is slipped under the edge of the cover slip and allowed to dry for a while, it will adhere firmly to the glass, the cell material contained in it being anchored to its surface. At the same time interchange with the surrounding medium and growth and reproduction will not be interfered with. Thus prepared, the cover slip is placed on blocks glued to a slide, and the chamber thus formed is filled with either the nutrient medium or a bacterial broth culture. The bacterial cells then arrange themselves naturally beneath the isolating membrane and do not impede observation of the experimental material. This affords an opportunity for studying the mechanism of the growth and reproduction of bacterial cells in populations in the course of formation. Cover slips thus prepared are not liable to dry up and can be prepared in advance and stored in closed dishes ready for use.

Broda (E.) & Frisch-Niggemeyer (W.) (Editors). **Biochemistry of Viruses ; Vol. 7 of the Proceedings of the Fourth International Congress of Biochemistry, Vienna.** xi+255 pp., 48 graphs, 28 fig., London, Pergamon Press, 1958, 63*s*.

The 32 papers presented at a symposium on this subject at the conference included: G. Schramm (pp. 1–8) 'Biosynthesis of tobacco mosaic virus' (in German); H. Fraenkel-Conrat & B. Singer (pp. 9–16) 'The structural basis of the activity of tobacco mosaic virus': B. Commoner (pp. 17–30) 'The biochemical basis of tobacco mosaic virus infectivity': V. L. Rÿzkov (pp. 31–44) 'Biochemical conditions for virus multiplication' (German) [**38**, 163, 422]; N. W. Pirie (pp. 45–57) 'The properties of fragments of tobacco mosaic virus' [**37**, 631]; A. Gierer (pp. 58–61) 'The properties of the infectious unit of tobacco mosaic virus' (German); K. W. Mundry & A. Gierer (pp. 62–65) 'Production of mutants of tobacco mosaic virus in vitro by chemical changes of its nucleic acid' (German) [**39**, 124]; W. Ginoza (pp. 66–71) 'The structure of the infectious ribonucleic acid of tobacco mosaic virus', with comments by I. Watanabe and by A. Klug; C. A. Knight (pp. 80–84) 'Chemistry of some virus variants': W. N. Takahashi (pp. 85–86) 'Electrophoretic experiments on the nucleic acid from tobacco mosaic virus'; M. Staehelin & M. P. Gordon (pp. 87–89) 'Biological effects of 5-fluorouracil on tobacco mosaic virus': and G. Ruttkaynedecky (pp. 90–94) 'The characteristic polarographic effect of tobacco mosaic virus'.

Paul (H. L.). **Die Bestimmung des Nucleinsäuregehaltes pflanzlicher Viren mit Hilfe einer spektrophotometrischen Methode. Der Zusammenhang zwischen dem Molekulargewicht pflanzlicher Viren und der spektrophotometrisch bestimmbaren Größe b_v.** [The determination of the nucleic acid content of plant viruses by means of a spectrophotometric method. The relationship between the molecular weight of plant viruses and the spectrophotometrically determinable value b_v.] *Z. Naturf.*, **14b**, 7, pp. 427–433, 3 graphs, 1959. [Engl. summ. 54 ref.]

At the Institut für landwirtschaftliche Virusforschung, Brunswick, Germany, the ribonucleic acid (RNA) content of 9 viruses was determined by Warburg and Christian's method (*Biochem. Z.*, **310**, p. 384, 1942] after elimination of light-scattering of the suspensions by calculation with Rayleigh's formula (*Z. Naturf.*, 4b, p. 252, 1949) or comparison with polystyrene latex suspensions of corresponding turbidity. The results were in satisfactory agreement with those obtained by chemical analysis.

The dependence of b_v (Warburg & Christian's nucleoprotein quotient) on mol. wt. is represented by a straight line on a semi-logarithmic scale, whereby the wt.

can be evaluated by measuring b_v if the virus entity is a pure ribonucleic protein containing RNA of a mol.wt. of 2×10^6. The resultant mol.wt. value is not affected by aggregation or fragmentation of the virus but is disturbed by protein or nucleoprotein impurities.

Gol'din (M. I.) & Vostrova (Mme N. G.). Применение реакции Сакагуши для гистохимического изучения вирусных и невирусных включений. [The use of the Sakaguchi reaction in the histochemical study of virus and non-virus inclusions.]—Воп. Вирусол. [*Vop. Virusol.*], *1959*, 3, pp. 367–369, 1959. [Engl. summ.]

Studies at the Inst. Microbiol., Acad. Sci., Moscow, confirmed the work of Rawlins, Weierich, and Schlegel [**37**, 172] that crystalline inclusions of tobacco mosaic virus give a clear-cut Sakaguchi reaction for arginine, though the X-bodies specific for this virus do not stain, whereas X-bodies characteristic of potato viruses X and Y give a distinct Sakaguchi reaction at different stages of development. Two forms of filamentous inclusion (crystals) were detected, which appear to be associated with the tobacco mosaic group. Though similar in appearance, they differ in their Sakaguchi reaction. For the histochemical study of virus inclusions by this reaction, fixation with a 1% trichloracetic acid solution for 10–15 min. is proposed; a finished preparation can be obtained within 30–40 min.

Lindner (R. C.) & Kirkpatrick (H. C.). **The airbrush as a tool in virus inoculation.** —*Phytopathology*, **49**, 8, pp. 507–509, 6 graphs, 1959.

Further studies at Wenatchee, Wash. [cf. **38**, p. 543], have shown that the use of an airbrush (a refined type of atomizer) [cf. **13**, 328; **24**, 265] can increase the efficiency of virus inoculation 10- to 20-fold, allowing a corresponding degree of dilution in the inoculum. A Paasche 'H3-in-1' artist's airbrush was used, with an 80-ml. reservoir, initially for inoculating cucumber cotyledons with tobacco mosaic virus. Opt. conditions were 1 cm. between the nozzle and the leaf surface (achieved by fitting a suitably sized cork with a central hole increasing in size), 4 atm. air pressure, inoculum delivery rate of 10 ml./min., 4 passes of the brush parallel to the midrib to cover a cotyledon (time, 4 sec.), and 1% w/w 600-mesh carborundum in the inoculum (other abrasives were less effective). There was less variation in local lesion numbers and the efficacy of the method is likely to aid infection by viruses of low titre.

Bos (L.). **Virusziekten van peulvruchten.** [Virus diseases of legumes.]—Reprinted from *Twintig jaren PSC*, pp. 212–220, 4 fig., [undated, received Sept. 1959].

A useful summary of information concerning the 12 viroses of peas [**37**, 748], beans [*Phaseolus vulgaris*], broad bean, clovers [**38**, 503], lucerne, and lupins in the Netherlands and their cross-infectivity.

Diener (T. O.) & Weaver (M. L.). **Infectivity of phenol-extracted preparations from Cucumber leaves infected with necrotic ringspot virus.**—*Virology*, **8**, 4, pp. 531–532, 1959.

At the Irrigation Exp. Sta., Prosser, Wash., 2 isolates of [peach] necrotic ring spot [**38**, 531, 610] from *Prunus mahaleb*, maintained in cucumber, and *Prunus* virus B [**38**, 154], maintained in squash, were subjected to Gierer & Schramm's procedure (*Nature, Lond.*, **177**, pp. 702–703, 1956) of phenol extraction of filtered aqueous suspensions of crushed leaves. The infectivity of the preparations obtained was determined by immediate inoculation of 18–26 cucumber plants. Dilution series prepared from the original centrifuged leaf extracts were used as controls for estimating relative infectivity, all procedures being carried out at 3–5° C. The necrotic ringspot phenol extracts were infectious in all experiments where the

original crude extract had a dilution end point of $\frac{1}{64}$ or 'better', and their infectivity was of the order of 1% of that of the original leaf extracts, but was completely lost after storage at 3–5° C. for 1 hr., though the controls retained some infectivity after 72 hr. The extreme lability of the infectious entity, together with the reversible inhibition of infection encountered with ribonuclease preparations exceeding 0·2 μg. ml., prevented determination of its sensitivity to ribonuclease. *Prunus* virus B extracts were not infectious. These findings are additional evidence [**37**, 293] that the viruses are distinct.

Bradley (R. H. E.). **Loss of virus from the stylets of aphids.**—*Virology*, **8**, 3, pp. 308–318, 3 fig., 1 graph, 1959.

Studies at the Ent. Lab., Fredericton, N.B., Canada, showed that, during feeding, viruliferous *Myzus persicae* stopped transmitting potato virus Y to healthy White Burley tobacco plants in a few min. This phenomenon was investigated to throw light on the suggestion [cf. **38**, 73, *et passim*] that inhibitors in plant tissue are responsible for preventing transmission. Transmission also ceased within a few min. when the aphids probed different plant spp., onion epidermis, or a solid membrane containing no liquid. The ejection of saliva in itself played no part, as the process did not remove sufficient virus to reduce the number of aphids able to transmit. The virus could be washed from the stylets quite easily by several insertions into water. Body fluid from crushed aphids, which inhibits the virus *in vitro*, did not, when applied to the stylets, reduce the number of aphids transmitting the virus.

It is concluded that none of these findings, or those of other workers, conflict with the hypothesis that probing causes aphids to cease transmitting virus Y primarily because the virus is scoured from the stylets as they penetrate. It is unnecessary to postulate that saliva round the penetrating stylets adversely affects virus carried by them.

Kooistra (G.). **Investigations into the chemotherapeutic activity of nitroso hydroxyaryl compounds towards some virus diseases.**—*Acta bot. neerl.*, **8**, 4, pp. 373–421, 1 graph, 1959. [2½ pp. ref.]

In preliminary tests at the Woodstock agric. Res. Cent., Sittingbourne, Kent, England, many substances were screened under glass for therapeutic activity without phytotoxicity; those selected were examined in the field to select inhibitors of virus increase and not simply inhibitors of infection, active only when inoculated simultaneously with the virus [cf. Bawden, **34**, 514]. The viruses used were tobacco mosaic in 3 spp. of tobacco, beet yellows in Kuhn P. sugar beet, and bean common mosaic and bean yellow mosaic in Beka French bean (*Phaseolus vulgaris*) and Driemal Wit broad bean, the substances being applied (at 0·1%) to the foliage as sprays or to the roots 2 days before inoculation. The degree of infection was determined by serology, which was successful, and also by a reducing sugar test, a reso blue test (Schuster, *Nachrbl. dtsch. PlSchDienst, Berl.*, **10**, p. 243, 1956), and a test with 2,3,5-triphenyl tetrazolium chloride [cf. **35**, 583], all of which were unsuccessful.

Most promising and also non-phytotoxic were *p*-nitrosophenol, 1-nitroso-2-naphthol, and the copper sulphate complex of *o*-nitroso-*p*-chlorophenol, the chemotherapeutic activity, i.e. the av. percentage change in incubation period, being rated at 13, 13, and 12, respectively; the K [? Na] salt of 1-nitroso-2-naphthol-3,6 disulphonic acid was equally active, but somewhat phytotoxic; thiouracil and its mixtures with *p*-nitrosophenol and 1-nitroso-2-naphthol were particularly good and non-toxic on tobacco at 0·05+0·05%.

In field trials (1954–58) with sugar beet 1-nitroso-2-naphthol (usually the K salt) gave an average yield improvement of 7%±1½, while the other nitroso

derivatives were without significant activity. On tobacco nitroso-thiouracil mixtures were reliable, but on other plants were too toxic. The nitroso compounds were beneficial only at 0·1%, 2 or at most 3 sprayings being permissible: at higher concs. phytotoxicity outweighs antiviral action. It may be that breakdown products of the nitroso compounds in the plant unite with uracil, or some other substance necessary for virus synthesis.

A table lists from the literature all the chemicals reported to have antivirus properties.

Cacao : pest, disease and weed control.—31 pp., 39 fig., London, Shell Co., 1958.

This very well illustrated publication contains a section (pp. 19-27) on the control of 13 fungus diseases of cacao with Shell fungicides; useful references to recent literature are incorporated in the text. A short note on virus diseases of cacao deals primarily with swollen shoot.

Thresh (J. M.) & Tinsley (T. W.). **The viruses of Cacao.**—*Tech. Bull. W. Afr. Cacao Res. Inst.* 7, 32 pp., 6 pl. (1 col., 17 fig.), 1959. [62 ref.]

This useful paper summarizes published and unpublished information on viruses isolated from cacao [cf. **38**, 250, 360] in various parts of the world. The subject matter is treated under the headings 'General features of cacao viruses and criteria for their classification'; 'Differences between viruses from different localities'; 'Differences between isolates from different trees in the same locality'; 'Differences between isolates simultaneously infecting particular trees'; 'Relationships between viruses from cacao and those affecting wild hosts'; 'Relationships between the various isolates of virus from cacao'; and 'Suggestions for future work'.

Greater attention should be paid to the differences between isolates from adjacent localities, and from the different parts of sampled trees. Isolates should be given a locality name only when they are typical of an area; repeated single insect transfers should be performed to establish relatively stable cultures and increase the precision of laboratory experiments. Typical isolates should be compared on the same type of host under standard conditions, avoiding quarantine difficulties by doing the work under glass in a temperate country. It is suggested that it would suffice to study symptoms only on unpigmented Amelonado seedlings infected as beans, though clones of greater uniformity and sensitivity as differential indicators may be found. Repeated failure to transmit cacao viruses by sap inoculation should not discourage fresh attempts with new techniques.

Further testing of the susceptibility of the commoner Tiliales indigenous to W. Africa may indicate strain relationships and other wild hosts; hosts of known differential susceptibility and the symptoms produced in different hosts deserve special attention. Large scale cross protection tests should be postponed until a detailed study of the protection phenomenon has revealed the best techniques.

Using criteria obtained from a study of isolates from different parts of W. Africa the authors propose to classify the viruses there into 3 groups: cacao necrosis virus [**37**, 465], cacao mottle leaf virus (unrelated to other cacao viruses, not apparently transmitted by *Ferrisiana virgata*, restricted to *Adansonia digitata* apart from cacao), and cacao swollen shoot virus. The characteristics of these are summarized.

Wood (G. A. R.). **Cocoa-growing in Venezuela, Colombia, and Ecuador, with notes on three Cocoa diseases.**—57 pp., 51 fig., 3 graphs, 3 maps, Bournville, Cadbury Bros. Ltd., 1959. 5*s*.

This general account of the industry is based on the author's observations during a trip to the countries in July and Aug., 1958. Brief descriptions, with good photographs, are given of pod rot (*Monilia roreri*), wilt (*Ceratostomella* [*Ceratocystis*]

fimbriata), and (in Colombia) cushion gall [**39**, 15], all of which appear to be spreading.

Atkins (I. M.) & Futrell (M. C.). **Diseases of small grains in Texas.**—*Bull. Tex. agric. Exp. Sta.* 921, 20 pp., 32 fig., 2 graphs, 1 map, 1958.

This survey, carried out in co-operation with the U.S. Dept Agric., covers fungal, bacterial, and virus diseases of wheat, oats, and barley, 28 in all. A brief account is given of each disease and its causal organism, recommendations for control, and notes on the resistance of vars.

Tyulina (Mme L. R.). Поражаемость озимой Пшеницы болезнями при весеннем посеве. [Disease incidence in winter Wheat when sown in spring.]—*J. agric. Sci., Moscow*, **4**, 6, pp. 139–143, 1959. [Engl., Germ., Fr. summ.]

Hybrid 186 wheat sown at the Nemchinovka Sta. of the agric. Inst., Moscow, on 20 May 1952 was heavily attacked (40%) by powdery mildew [*Erysiphe graminis*: **37**, 765] to which it is susceptible, while the autumn sowing (20 Aug.) was attacked (25%) by brown rust [*Puccinia recondita*: **39**, 17], to which it is moderately susceptible. The autumn sowing was mildly infected by *E. graminis* (1%). In 1953 incidence of *E. graminis* on the spring sowing was 5%. Analyses showed that there is a N deficiency in the plant which arrests the development of *E. graminis*.

When N fertilizers were applied susceptibility to mildew increased markedly. There was a difference in the sugar content of plants sown in spring and autumn but increase of sugars did not influence disease incidence.

Chakravarti (B. P.) & Hart (Helen). **Behaviour of haustoria of Puccinia graminis var. tritici. Stem rust infectibility and tolerance to stem rust attack in Wheat.**—Abs. in *Phytopathology*, **49**, 9, p. 535, 1959.

In several wheat vars. the 1st haustoria formed in epidermal cells immediately after the germ tubes had entered the stomata and, in about 70%, before invasion of the mesophyll; haustoria continued to form profusely in the epidermis, in leaf hairs, and even in guard cells in some resistant vars. In the mesophyll of Frontana wheat haustoria of race 56, 7–9 days after inoculation, caused the nucleus to enlarge and then approach and surround the haustorium. Race 56 heavily invaded the mesophyll of Frondoso-Kenya and produced normal haustoria, but the rust lesion was restricted by a barrier arising from changes and deposits in the host cells, the few hyphae penetrating this being appressed to the cell walls but failing to form haustoria.

The 2nd abstract notes the tolerance of some new wheats despite heavy rust attack. In spring wheats inoculated with race 15 B at jointing time, disease severity being held at 4 levels by parzate sprays, initial leaf infections reflected varietal differences and ranged from 2–5% on Lee, Langdon, and Sentry to 10–15 on susceptible Carleton. Seasonal increase followed a similar trend. The 1st 3 tolerated 50–70% infection and produced 80% of the yield (bush./acre) and 90% of the kernel wt. of their controls. Carleton produced only 40–60% yield, and $< 85\%$ kernel wt.

Kenaschuk (E. O.), Anderson (R. G.), & Knott (D. R.). **The inheritance of rust resistance. V. The inheritance of resistance to race 15 B of stem rust in ten varieties of durum Wheat.**—*Canad. J. Pl. Sci.*, **39**, 3, pp. 316–328, 1959.

In further studies at Univ. Saskatchewan, Saskatoon, on resistance to *Puccinia graminis tritici* [cf. **38**, 684] in F_2 wheat plants from diallele crosses and on F_2 families from back-crosses to the susceptible Stewart and Nugget, it was shown that vars. St. 464, C.I. 7805, Amarai bianco tipo 142 (P.I. 192179), C.I. 7870, C.I. 7875, and C.I. 8133 all had a dominant Srd 2 gene which conditions a type 1—X reaction;

a dominant Srd 4 gene conditioning a type 2–2+ reaction was present in Arabian, Rojal de Almeria (P.I. 191194), and Golden Ball. Dominant Srd 5, which conditions a type 2 reaction, was present in the same vars. as Srd 2 and Arabian; Srd 6 (partly dominant) conditions a type 1⁻–1 reaction in Camadi.

Hiratsuka (N.). **Susceptibility of varieties of Aegilops squarrosa to black rust (Puccinia graminis f. sp. tritici) and brown rust (P. triticina).** –*Seiken Zihô (Rep. Kihara Inst. biol. Res.)* 8, pp. 9–10, 1957. [Received Aug. 1959.]

All the *typica* and *anathera* strains of *A. squarrosa* collected in the Karakoram and Hindukush proved susceptible to *P. g.* f. sp. *tritici* and to strains 1 A and 21 B of *P. triticina* [*P. recondita*], the commonest strains in Japan; a strain of var. *meyeri*, was highly resistant to these. In the *meyeri* × *typica* cross *meyeri* resistance was dominant and segregation in the F_2 monofactorial. Strain 2112 of var. *strangulata* showed some resistance to *P. g.* f. sp. *tritici* and 2118 was resistant to *P. recondita*; strain 2135 also segregated into lines susceptible and moderately resistant to these rusts.

Johnston (C. O.). **Physiologic races of the leaf rust of Wheat, Puccinia recondita Rob. ex Desm., in the United States in 1958.**—*Plant Dis. Reptr.* **43**, 9, pp. 998–999, 1959.

In the annual determinations at Manhattan, Kans. [**38**, 197], 28 races of *P. recondita* were isolated from 295 collections on wheat from 28 States. Race 15 was again the most widespread, followed in order by 5, 122, 2, 11, and 6. Races 11, 26, 131, 1, and 53 were most abundant in the Pacific coast region, race 6 and similar races in the N. central region, race 58 only in N.Y.

Митов (N.). Устойчивост на някои сортове зимни и пролетни Пшеници в зависимост от стадийното им развитие спярмо отделни физиологически раси от групата на 21 раса пакафявата ръжда—**Puccinia triticina Erikss.** [The resistance of some winter and spring Wheats, depending on their stage of development, to different physiological races of the group of race 21 of brown rust *P. recondita*.]—*Bull. Plant Prot., Sofia*, **7**, 1–2, pp. 14–25, 2 fig., 1958. [Russ., Engl. summ.]

In experiments at the Inst. Plant Protection, Sofia, Bulgaria, in 1953–55, with the winter vars. nos. 11, 521–1PP and 1295–1PP, and spring vars. Thatcher, Mercury, and 142–1PP, using vernalized and non-vernalized seeds, all were grown under short day conditions (7 hr. light) up to the time of infection, or normal day (control), or 7 hr. light until the controls began flowering and thereafter in daylight. After inoculation with races 21, 21-a, and 77 by spraying a uredospore suspension in 2% gelatin solution the plants were kept in the inoculation chamber for 48 hr.

All vars. were susceptible to race 77; Mercury proved resistant to 21 and 21-a; 2 of the spring vars. showed resistance to 21, but 142–1PP proved susceptible under reduced daylight. All plants grown under short daylight were more susceptible; vernalization increased the speed of growth.

Kobel (F.). **Neuere Ergebnisse der Gelbrostuntersuchungen.** [Recent results of investigations on yellow rust.]—*Mitt. schweiz. Landw.*, **7**, 9, pp. 134–138, 1959.

A general survey from the Eidg. Landw. Versuchsanst., Zürich, of the factors involved in outbreaks of wheat yellow rust [*Puccinia striiformis*: **36**, 5] in Europe and their control by breeding and prevention.

Lu (S.-I.), Yang (T.-N.), Wu (W.-T.), Fan (K.-F.), Lee (W.-N.), & Lee (K.-C.). **A study on stripe rust of Wheat and grasses.**—*Acta phytopath. sinica*, **4**, 2, pp. 137–144, 1 fig., 1958. [Chin. Abs. from Engl. summ. Received Sept. 1959.]

Studies by the Inst. Appl. Mycol., Academia Sinica, Peking, showed that in Shensi province *Elymus chinense* was heavily infected by *Puccinia glumarum* [*P. striiformis*: **37**, 153], but the str. differed greatly from that on wheat in pathogenicity and in uredospore measurements, and was designated race Y1E. *E. chinense* was resistant to 14 *P. striiformis* collections from wheat, while 13 improved vars. of wheat were resistant to 5 collections from *E. chinense*. Successive inoculations with large quantities of uredospores showed that race Y1E could not continue on wheat beyond 5 uredospore generations. Different *Triticum* spp. were either immune from or highly resistant to the race.

P. striiformis from wheat attacked different grasses, *Bromus tectorum* and *E. sibiricus* being highly susceptible. Race Y1E could tolerate a much higher temp. than races collected from wheat vars. and prolific sporulation was obtained at 25° C. Rust from *E. sibiricus* and *Agropyron* spp. severely attacked seedlings of many wheat vars.

Lu (S.-I.) & Lee (K.-C.). **Effect of light and temperature on varietal resistance of Wheat to Puccinia glumarum Erikss. & Henn.** —*Acta phytopath. sinica*, **4**, 2, pp. 129–136, 1 fig., 1958. [Chin. Abs. from Engl. summ. Received Sept. 1959.]

Further studies [cf. above] on physiological specialization of *P. striiformis* showed that control of temp. (constant at 15° C.) and a stable light source were necessary to observe varietal reaction. Fluorescent lamps giving 16 hr. light of 4,000 lux were found sufficient. Resistance of wheat vars. increases as the temp. rises above 10° C. Out of 60 var.-race combinations, 8 changed their reaction from susceptible to resistant at 15°, 15 at 20°, 18 at 25°, while 16 remained unchanged at different temps.

Highly resistant vars. such as Early Premium, Li-Yung I, and Naking 4179 remained resistant to all 4 races tested under a wide range of light intensity, while the highly susceptible var. Lenta 1885 remained susceptible.

Race Y6B, isolated from Pima I, has proved dangerous, causing severe infection of Pima strs. at 10–20° and sporulating at 25°. Race Y6, resembling Y6B in pathogenicity on 6 differential hosts, was isolated in the Shantung and Shansi provinces during 1954–5; associated with this is a breakdown in resistance of Pima I since 1955. Early Premium, Naking 4197, Li-yung I, and Nungta 6 are highly resistant to Y6B.

Zogg (H.). **Neuere Untersuchungen über das Auftreten und die Bekämpfung des Zwergbrandes bei Winterweizen.** [Recent studies on the occurrence and control of dwarf bunt on winter Wheat.]—*Mitt. schweiz. Landw.*, **7**, 5, pp. 65–74, 5 fig., 1959.

Much of the material here reported from the Eidg. Landw. Versuchsanst., Zürich, has already been covered [**38**, 472]. The author stresses the importance of strict attention to hygiene and crop rotation. Where *Tilletia contraversa* infection is already making its appearance the soil may be treated with hexachlorobenzene and pentachloronitrobenzene preparations 1–3 weeks after sowing. The soil should then not be worked for 3 weeks.

Dobretsov (A. N.). Результаты испытаний новых протравителей против твердой головни яровой Пшеницы. [The results of trials of new treatments against covered smut of spring Wheat.]—Бюлл. науч.-тех. Информ. Краснояр. н.-и Ин-та сел. Хоз. [*Bull. nauch.-tech. Inform. Krasnoyar. n.-i. In-ta sel. Khoz.*], *1958*, 3, pp. 76–79, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 15, p. 202, 1959.]

Hexachlorobenzene and thiram, both at 2 kg./ton seed, are recommended by the Lab. Plant Prot., Krasnoyarsk agric. Res. Inst. for dry treatment of seed [against *Tilletia*: **37**, 582]. Captan and fuclasin were less efficient.

Tsmŷbal (M. M.). Полусухое протравливание семян озимой Пшеницы. [Semi-dry treatment of winter Wheat seed.]—*J. agric. Sci., Moscow*, **4**, 6, pp. 144–145, 1959. [Engl., Germ., Fr. summ.]

At the phytopath. Lab. All-Union Res. Inst. for Maize, granosan (0·5 and 1 g./kg. seed in 25 ml. water) and a local product derived from granosan containing ethylmercuric chloride (10 and 20 mg.) with a perceptible odour, were used 1 month before sowing for treatment of wheat seed inoculated with bunt chlamydospores (*Tilletia levis*) [*T. foetida*: cf. above; **39**, 18]. Seed treated with 20 mg. ethylmercuric chloride germinated 93·9% and the plants were completely free from infection. Untreated seed germinated 87·8% and had 34·2% infected ears. With 1 g. granosan germination was slightly lower. The semi-dry treatment was superior to the dry (0·3 compared with 1·8% infected ears).

Mitov (N.). Физиологически раси при праховитата главня по Пшеницата **(Ustilago tritici (Pers.) Jensen)** в България. [Physiological races of loose smut (*U. nuda*) of Wheat in Bulgaria.]—*Bull. Plant Prot., Sofia*, **7**, 3–4, pp. 7–19, 2 fig., 1958. [Russ., Engl. summ.]

The Piekenbrock apparatus [**7**, 435] was used at the Inst. Plant Prot., Sofia, Bulgaria, to inoculate Grevel's test wheat vars. [**9**, 708] and 5 Bulgarian with 20 samples of loose smut (*U. nuda*) [**22**, 92] from various parts of the country. Races 3, 5, 6, 7, 8, 9 were detected, of which only 3 corresponded to a known international race (3), the others being considered new. Roter Schlanstedter was immune from race 5, Heines Kolben from race 6, and both from race 7, Heines Kolben and Peragis from race 8, and only the latter from race 9. The Bulgarian var. Erythrospermum 134–IPP [Institute of Plant Protection: IZR in text] proved immune from all the races; the other Bulgarian vars. were susceptible. Races 8 and 5 are the most widespread.

Mitov (N.). Устойчивост на някои наши и чуждестранни сортове Пшеници към 6 физиологически групи раси на праховитата главня—**Ustilago tritici (Pers.) Jensen.** [Resistance of some Bulgarian and foreign Wheat varieties to 6 groups of physiological races of loose smut—*U. nuda*.] —*Bull. Plant Prot., Sofia*, **7**, 3–4, pp. 21–33, 1958. [Russ., Engl. summ.]

In further work [cf. above] in 1955–57, 10 Bulgarian and 11 foreign vars. of spring and winter wheat were inoculated by Grevel's method [loc. cit.] with 20 samples of *U. nuda* representing 6 races. Following Dodov's treatment of races of *Puccinia triticina* [*P. recondita*: **11**, 359], in which only clearly defined groups were considered, sub-groups of races were disregarded. The spring vars. Thatcher, Mercury, and 142-IPP were completely immune from all known races in Bulgaria and the reciprocal reaction of some vars. such as 301 and 165^{v} suggested that these also could be used in a breeding programme, though many more vars. should be tested for resistance to the established races.

Salt (G. A.). **Eyespot on Wheat in ley-arable rotation experiments at Rothamsted, 1952–58.**—*Plant Path.*, **8**, 2, pp. 59–61, 1959.

These experiments were started at Rothamsted in 1948 on 'Fosters', arable for 100 yr., and 'Highfield', parkland grass for even longer, to compare incidence of soil-borne diseases in a 6-yr. arable rotation with 3-yr. arable following 3-yr. grass or lucerne. Eyespot [*Cercosporella herpotrichoides*: **39**, 19] occurred on wheat (Yeoman) in all the rotations but only on a few straws each yr. after 3-yr. grass or lucerne. It was always more prevalent in the arable rotation when barley preceded winter wheat, slight infection in the former causing prevalence in the succeeding wheat in years favourable to the disease (e.g. 1954 and 1955); lodging was 80% in the severely infected crop on Fosters in 1954. After oats replaced barley in 1955, there was

very little eyespot in any of the rotations. Take-all (*Ophiobolus graminis*) did not develop (except for a trace) in 1955 on wheat in the arable rotation on Highfield. Sharp eyespot (*Rhizoctonia* [*Corticium*] *solani*) was not usually prevalent, though it occurred throughout to some extent each year (a mean of 7·1% infected straws on Highfield and 2·2% on Fosters). In 1 yr. (1954) out of 4 the grain yield was reduced on Fosters by 13½ cwt. through eyespot and consequent lodging.

The control of these diseases, often achieved by quite simple alterations in cropping, greatly improves the value of ley-arable experiments designed to investigate agronomic problems.

Henry (A. W.) & McKenzie (A. R.). **Note on the comparative activity of monosporous and mycelial isolates of Ophiobolus graminis Sacc. from the same source as Wheat pathogens in natural and sterilized soil.**—*Canad. J. Pl. Sci.*, **39**, 3, pp. 405–407, 1 fig., 1959.

At the Univ. Alta., Edmonton, Red Bobs wheat seedlings were grown in sterilized and unsterilized soils inoculated with monospore or mycelial isolates of *O. graminis* [**18**, 792] derived from the same source. Both lots of isolates caused severe infection in sterilized soil, but in the natural soil whereas all but 1 of the monospore isolates caused severe infection, all but 1 of the mycelial isolates caused only moderate to light infection. In general the monospore isolates seemed better able to compete with other soil organisms [**38**, 672].

Moseman (J. G.) & Roane (C. W.). **Physiologic races of Barley leaf rust (Puccinia hordei) isolated in the United States from 1956 through 1958.**—*Plant Dis. Reptr*, **43**, 9, pp. 1000–1003, 1959.

During this joint investigation by the U.S. Dept Agric. and the Va agric. Exp. Sta., Blacksburg, 6 physiologic races of *P. hordei* [**34**, 31] were isolated from barley, 70% of the cultures being race 4. Outstanding for resistance [cf. **35**, 885] were 7 new vars. When inoculated with 7 cultures isolated from barley in 1958 and a culture of race 4 isolated in 1955 Cebada capa (C.I. 6193) and Aim (C.I. 3737) proved resistant to all. Aim appears to have an additional gene for resistance not present in the other vars. Little Club was immune from 39 cultures.

Caldecott (R. S.), Stevens (H.), & Roberts (B. J.). **Stem rust resistant variants in irradiated populations—mutations or field hybrids?**—*Agron. J.*, **51**, 7, pp. 401–403, 1959.

At the Univ. Minn. agric. Exp. Sta. seeds of the hexaploid oat var. Markton, susceptible to all known races of *Puccinia graminis* f. sp. *avenae*, were subjected to thermal neutron bombardment in an attempt to induce mutations for resistance [cf. **34**, 223].

In the N_1 generation 1 lot of plants was grown under isolated conditions and a 2nd in a nursery where chance field hybridization could occur. N_2 nurseries were established from both and subjected to an epiphytotic of race 2. Resistant variants were numerous among progeny from the non-isolated N_1 nursery, but not among the other. Apparently field hybridization occurs on a considerable scale in irradiated populations not protected against outcrossing. It is suggested that the many resistant variants found by other workers in progenies from irradiated seed may stem from field hybridization in the N_1.

Konzak (C. F.). **Radiation-induced mutations for stem rust resistance in Oats.**—*Agron. J.*, **51**, 9, pp. 518–520, 1 fig., 1959. [17 ref.]

Variants resistant to stem rust (*Puccinia graminis* [f.sp.] *avenae*) obtained in earlier work on the induction of resistance in oats by radiation [**34**, 223] were found to result from natural field hybridization [cf. above]. Further experiments, however,

yielded new variants at a low frequency in one instance but none in another. There were over 3,000 lines from irradiated seeds.

A previously unknown type of resistance reaction, viz. a temperature-sensitive resistance to race 7A [cf. **38**, 140, 255], was detected in a mutant. It is suggested that some as yet unknown modifying factors may limit the development of induced changes into mutations.

SIMONS (M. D.) & MICHEL (L. J.). **Physiologic races of crown rust of Oats identified in 1958.**—*Plant Dis. Reptr*, **43**, 9, pp. 1010–1012, 1959.

Since the last compilation [cf. **37**, 405] of previously unnumbered races of *Puccinia coronata*, 2 new races have been discovered: 298, 1st isolated near Ames, Iowa, differs sharply from all members of race group 290 and all other common races by inducing a highly resistant reaction in the usually susceptible Appler; and 299, isolated in Minn. The overall pattern of relative prevalence of the more common races was much the same as in 1957. Race 216 accounted for 54% of the isolates, and Landhafer, highly resistant in the greenhouse, may be damaged under some field conditions. Race 213, the 2nd commonest, comprised 14%, and the group of races attacking Bond but not Victoria or Landhafer was 3rd (18%), with race 202 their most prevalent representative.

KRUPKA (L. A.). **Metabolic effects of the fungal-toxin victorin.**—*Diss. Abstr.*, **19**, 12, p. 3095, 1959.

At Louisiana State Univ. 2,4-dinitrophenol, an uncoupler of oxidative phosphorylation, had no effect on susceptible oat tissue pretreated for 4 hr. with victorin [**38**, 202] produced by *Helminthosporium victoriae*; sodium fluoride, inhibitor of glycolysis, nullified the respiratory increase induced by victorin, and sodium diethyldithiocarbamate and phenylthiourea, both inhibiting Cu-containing enzymes, had a greater effect on victorin-treated tissues than on controls, whereas malonic acid, a Krebs cycle inhibitor, had the reverse effect. Ascorbic acid oxidase activity was 2–4 fold greater in homogenates of susceptible oat tissues than in the toxin-treated resistant or untreated susceptible tissues; in toxin treated susceptible tissues there was 3 times less ascorbic acid than in untreated.

HARPAZ (I.). **Needle transmission of a new Maize virus.**—*Nature, Lond.*, **184**, 4688, pp. B.A.77–B.A.78, 1959.

At the Hebrew Univ., Rehovot, Israel, transmission of rough dwarf disease of maize [**38**, 475] was obtained by injecting Neve Yaar single-cross hybrid 22 maize seedlings using a 1 ml. syringe and 0·2 ml. for 5 punctures/plant with the supernatant fluid after centrifuging for 5 min. at 3,000 r.p.m. sap (squeezed through cheese cloth) from diseased plants. Stem and leaf symptoms, including the rare split blade, developed in 3 of 12 plants after 2 months. The infectivity of frozen sap was retained for at least 24 hr.

KOLOMIETS (N. G.). Значение калийной подкормки в борьбе с пузырчатой головней Кукурузы. [The significance of auxiliary potassium nutrition in the control of blister smut of Maize.]—Науч. Зап. Белоцерковск. сел.-хоз. Ин-та [*Nauch. Zap. Belotserkovsk. sel.-khoz. In-ta*], *1958*, 7, pp. 32-36, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 15, p. 202, 1959.]

Resistance is increased and development of smut [*Ustilago maydis*: cf. **38**, 739] inhibited by the introduction of KCl into the soil at a depth of 8–10 cm.

PARKER (D. T.) & BURROWS (W. C.). **Root and stalk rot in Corn as affected by fertilizer and tillage treatment.**—*Agron. J.*, **51**, 7, pp. 414–417, 1959.

From observations on the incidence of root and stalk rot of maize (*Gibberella zeae*) [**35**, 821], frequently associated with the secondary invader *Fusarium moniliforme*

[*G. fujikuroi*: **38**, 593; 740] at Iowa agric. and Home Economics Exp. Sta., in plots in which the effects of different tillage systems and N and K levels were under comparison, the authors drew the following conclusions: leaving crop residues on the soil surface lessened the incidence of the disease; high N [cf. **38**, 513] markedly increased it; higher levels of K gave a small but significant decrease; the N/K ratio in leaf tissue was directly related to incidence, primarily as a result of the effect of N; critically low N would have been required to afford any control of the disease; with low N and with a crop residue left on the soil there was little disease but the crop was slow in growing and maturing; yields were markedly reduced when plants died of the disease before the ears were fully developed.

Murty (T. K.) & Subramanian (S. S.). **A note on the metabolic products of Helminthosporium oryzae.**—*Curr. Sci.*, **28**, 7, pp. 282–283, 1959.

In a study of fungi affecting rice plants and paddy at the Dept Pharmacy, Andhra Univ., Waltair, India, it was shown that *H. oryzae* [*Cochliobolus miyabeanus*] produced a small amount of ergosterol as a metabolic product.

Inoue (Y.), Goto (K.), & Ohata (K.). **Overwintering and mode of infection of leaf blight bacteria of Rice plant.**—*Bull. Div. Pl. Breed., Tokai-Kinki agric. Exp. Sta.*, **4**, pp. 74–82, 1957. [Jap., with Engl. summ. *Biol. Abstr.*, **33**, 12, p. 3931, 1959.]

The direct isolation of *Xanthomonas oryzae* from rice [**35**, 714] is described and evidence is adduced that the organism overwinters in the field in Japan. Attempts at isolation during winter from the roots of winter crops succeeding rice and from soil in which affected rice had grown were unsuccessful [cf. **38**, 742]. Irrigation water is a common carrier.

Corbetta (G.) & De Rege (F.). **L'analisi del rapporto azoto-sostanze organiche in relazione alla malattia del Riso nota come 'gentiluomo'.** [The analysis of the ratio of nitrogen to organic substances in relation to the Rice disease known as 'gentiluomo'.]—*Riso*, **6**, 10, pp. 8–10, 4 fig., 1957. [Received July 1959.]

After briefly reviewing the literature dealing with the effect of soil factors on the rice disease known in Italy as 'gentiluomo' [cf. 'man rice': **10**, 361] and on 'straighthead' in the United States [**38**, 742], which closely resembles it, at least in the symptoms produced [cf. **25**. 472; **31**, 31], the authors report that the soil of 3 affected fields had a low ratio of N/organic substances, whereas 8 healthy fields did not. This does not appear to be the determining cause of the disease, however, though it may be associated with it.

Pei (M.-Y.) & Hsu (H.-K.). **Studies on the red-leaf disease of the Foxtail Millet (Setaria italica (L.) Beauv.) III. Further studies on the transmission of the Millet red-leaf disease virus. IV. The development of red-leaf disease of Millet and its control.**—*Acta phytopath. sinica*, **4**, 2, pp. 87–93, 1958; **5**, 1, pp. 12–20, 1959. [Chin. Abs. from Engl. summ.]

Further investigations [cf. **38**, 82] showed this virus to be neither mechanically nor seed transmissible. In addition to the 3 already established [cf. **37**, 233], 13 additional aphids were demonstrated to be vectors; efficiency of transmission varied from 100% with *Aphis maidis* to 10% with *Macrosiphum granarium* [*M. avenae*] and was largely influenced by the nature of the acquisition host. Winged *A. maidis*, rather than apterous, are mainly responsible for the spread of the disease.

Paper IV notes that plants from infected seedlings suffer much heavier damage than those infected at a later stage. There is more disease in earlier sowings than in later, but infection is mainly determined by the prevalence of the migrating aphids. Tests with *A. maidis* on virus hosts (11 perennial graminaceous weeds)

showed that the aphids did not overwinter on them, but the virus overwintered in *Panicum virgatum* and *Bouteloua curtipendula* under natural conditions. Attempts to control the disease with organic P insecticides have failed; 4 of over 200 millet vars. tested have proved strongly tolerant of the disease and are agronomically suitable.

Vieira (J. de C.). **Declínio precoce da Toranjeira.** [Premature decline of Grapefruit.]—*Gaz. agric. Moçamb.*, **11**, 121, pp. 167–170, 6 fig., 1959.

In connexion with the recent detection of citrus tristeza virus [map 289] the symptoms of the disease are briefly described and control measures fully discussed. Although the problem has not yet reached an acute stage in Mozambique, its appearance on 3-yr.-old trees in new plantings gives cause for alarm.

Opitz (K. W.). **Beware of exocortis with Trifoliate, Troyer rootstocks.**—*Calif. Citrogr.*, **44**, 11, pp. 362, 374, 2 fig., 1959.

Both trifoliate orange [*Poncirus trifoliata*] and Troyer citrange rootstocks are susceptible to citrus exocortis virus [cf. **38**, 596], and between 50 and 80% of old-line orange trees on other commercial rootstocks are symptomless carriers of this virus.

The obvious symptom is the occurrence of narrow, vertical, thin strips of partially loosened outer bark. The trees are usually dwarfed when this appears, and dwarfing may occur with both rootstocks in the absence of bark symptoms. In some groves both symptoms are equally severe on both stocks but often Troyer is less affected, with only some degree of dwarfing. These differences between the rootstocks may possibly be due to different strains and combinations of strains of the virus, but environmental factors determine symptom expression to a considerable extent.

Trabut (L.). **On an infectious chlorosis of Citrus.**—*Calif. Citrogr.*, **44**, 11, pp. 382–383, 1959.

This paper from *C.R. Acad. Sci., Paris*, **156**, pp. 243–244, 1913, here translated from the French, is believed by L. J. Klotz to record the 1st instance of graft transmission of a virus disease of citrus.

Donadze (V. Z.). Роль шипа подвоя в проникновении возбудителя болезни мальсекко в Лимонное растение. [The role of the rootstock spur in the penetration of the causal agent of mal secco disease in the Lemon tree.]—Бюлл. всес. н.-и. Ин-та Чая и субтроп. Культур [*Byull. vses. n.-i. In-ta Chaya i subtrop. Kul'tur*], *1957*, 4, pp. 114–117, 1957. [Engl. summ. Abs. in *Referat. Zh. Biol., 1958*, 17, pp. 205–206, 1959.]

It was established that one of the possible points of entry of *Phoma* [*Deuterophoma*] *tracheiphila* [cf. **38**, 517] is the cut surface of the rootstock spur after budding or grafting and before the scion has completed its fusion.

Baines (R. C.), Small (R. H.), DeWolfe (T. A.), & Klotz (L. J.). **Controlling Citrus nematode and Phytophthora fungi.**—*Calif. Citrogr.*, **44**, 11, pp. 380–382, 1959.

In 2 large scale field trials at the Univ. Calif., Riverside [cf. **37**, 720], in which mylone 50 D (a preparation of 50% mylone in bran) was spread evenly on the surface of tilled soil, and carried down by sprinkler irrigation (approx 6 in.), *Phytophthora* spp. [**39**, 24] could not be isolated from the surface 2 ft. of soil after treatment. Such a method suits uneven or rocky ground or sloping sites where the basin method is inapplicable. On loamy soils mylone should be spread evenly at 400 lb. active ingredient/acre and mixed into the surface 2 in. if it is to be sprinkled, when 6–7 in. water must be infiltrated into the soil. On sandy loam 6 in. water is

applied in basins. Though no tests have been conducted on sand and gravel soils 300 lb./acre followed by 4–5 in. water is suggested. Citrus trees may be planted 1 month after treatment.

AIYAPPA (K. M.). **Citrus canker. Xanthomonas citri (Hasse) Dowson.**—*Mysore agric. J.*, **33**, 3, pp. 164–167, 1958. [*Biol. Abstr.*, **33**, 12, p. 3931, 1959.]

Inoculations demonstrated that *X. citri* [**38**, 476] can attack all above-ground parts of all cultivated vars. of citrus and many wild relatives. The author advises concerted government action, with the complete destruction of all diseased trees and nursery stock, the disinfection of tools and clothing, strict quarantine, and a spray schedule with Bordeaux mixture, lime-sulphur, or ultra-sulphur.

Annual Report 1958/9, Coffee Research Station, Ruiru and Coffee Research Services, Kenya.—v+70 pp., 7 graphs, 1959. 25*s*.

The work described in the plant pathology section (pp. 54–56) of this report [cf. **38**, 517] has been noticed [**38**, 693].

Pest and disease control on Coffee.—36 pp., 18 fig., London, Shell Co. [? 1958].

This admirably illustrated publication includes a section (pp. 24–30) on 12 diseases of coffee with suggestions for control with Shell products.

Papers presented at the Cotton Disease Council at Houston, Texas, December 16, 1958. *Plant Dis. Reptr. Suppl.* 259, pp. 199–235, 2 fig., 1 graph, 1 map, 1959.

A. L. SMITH (pp. 199–204), discussing progress with problems in cotton disease control, sets out the relative importance of 7 major cotton diseases in the U.S.A. for 1952–57 according to the estimated av. annual losses in bales resulting from each [cf. **36**, 27]. Seedling diseases (*Rhizoctonia*, *Pythium*, etc.), boll rots (*Glomerella*, *Diplodia*, etc.), and bacterial blight (*Xanthomonas malvacearum*) [**38**, 746], found throughout the cotton area, are those of greatest importance. D. D. PORTER, L. S. BIRD, & N. B. SMITH (pp. 205–208), dealing with the value of disease control in seedlings, refer to *Rhizoctonia* [*Corticium*] *solani*, *Fusarium* spp., and *Pythium* spp. [**38**, 600] and their control with different fungicides applied in-furrow at planting. At Greenville, where disease caused reduced stands, a net return of $27/acre was obtained when control was practised, and this also resulted in an earlier crop. Root injury without reduced stands lowered net return to $4. Under dryland conditions over a 2-yr. period this was increased by about $15 where replanting was not necessary, and $20 where it would have been. The av. yield of $\frac{2}{3}$ bale/acre indicates a 15–20% increased income from controlling seedling disease. J. B. SINCLAIR, L. L. MCCORMICK, D. R. MELVILLE, J. Y. OAKES, L. W. SLOANE, & D. WALTERS (pp. 209–212) found that treatment of cotton seed in Louisiana with potassium gibberellate gave no control of damping-off in the field and lowered stand. Panogen significantly increased stand [**38**, 407]. L. D. LEACH, R. H. GARBER, & W. H. LANGE (pp. 213–221) carried out cotton seed treatment trials in California, 1954–58, with special reference to specific fungicides, and found that while several (usually combined with an insecticide) gave fairly good protection in the field when disease incidence was moderate, they failed when infection was severe. The best results in the greenhouse against *Pythium ultimum* were obtained with Bayer 22555 (85% *p*-dimethylaminobenzene diazosodium sulphonate), 2 or 4 oz./100 lb. seed; pentachloronitrobenzene (75%) was the most effective against *C. solani* [loc. cit.; **38**, 600], and the 2 were best used together when both pathogens were present, either alone being ineffective. In 1958 the addition of PCNB to captan, ceresan 100, panogen, Bayer 15080 (20% quinoneoxime benzoylhydrazone), or Bayer 22555 significantly improved their protective value in the field.

A report by Katharina Bollenbacher & N. D. Fulton (pp. 222–227) on the disease susceptibility of cotton seedlings from artificially deteriorated seed (Hale 33) provided clear evidence that when heated at 50° C. and 100% R.H. for 24–96 hr. it was more vulnerable to decay and pre-emergence damping-off in proportion to the length of time of deterioration, and even more so to inoculation with damping-off fungi. The effects of individual pathogens are tabulated. L. S. Bird & C. W. Blackmon (pp. 228–232) describe the response of cotton vars. to seed deterioration (using Presley's method [**37**, 722]) and the influence of seed treatment on deterioration. Of 12 vars., Acala 1517c deteriorated faster than the others while Floyd 8 G, Delfos 9169, and Northern Star 11 were the slowest. Fungicides, especially at higher dosages, tended to increase the rate of deterioration. B. R. Houston & R. H. Garber (pp. 233–235) report a lint rot of cotton in California caused by *Nigrospora oryzae* [**8**, 568], found during the last 10 yr., boll infection ranging from a trace to 15% on individual plants. Infection occurs at or just before initiation of boll opening and results in a grey rot of the lint and a failure to fluff.

Maier (C. R.). **Survey of Cotton seedling disease prevalence and severity of losses in New Mexico in 1959.**—*Plant Dis. Reptr*, **43**, 9, p. 1048, 1959.

A survey by the N. Mex. agric. Exp. Sta., the results of which are tabulated, showed that the losses were 2·05% of the total potential crop or over $1,350,000. The av. stand over the State in mid-May was 3·3 plants/row-foot with an av. loss of 11·6%. These losses do not include those from seed rot or pre-emergence damping-off [cf. above].

Hervey (R. J.). **Growth studies on the Cotton root rot fungus, Phymatotrichum omnivorum. II. The effect of micro-organic amendments.**—Abs. in *Tex. Rep. Biol. Med.*, **17**, 2, pp. 198–199, 1959.

Fair growth occurs on simple mineral-carbohydrate, synthetic media. Of 17 recognized hormones, vitamins, or antibiotics added singly in traces to basic liquid or solid media, penicillin, gibberellic acid, and cold-sterilized steer-manure extract stimulated growth most regularly in 2 str., while carrot juice and autoclaved steer-manure extract were generally toxic. Str. 2 in a liquid medium was either inhibited or unaffected by streptomycin, thiolutin, bacitracin, phenazine dicarboxylic acid, terramycin, and actidione at 1–50 p.p.m., whereas penicillin (10–25), gibberellic acid (50), 2,4-D (100), 2-4-dichlorophenylsuccinimide (50–100), chlorophenylsuccinimide (25–100), and cold-sterilized steer-manure extract were stimulatory. Ascorbic acid, inositol, and a chelate were toxic. The growth of str. 5–2 was increased by terramycin, streptomycin, and penicillin (5–50), gibberellic acid, and chlorophenylsuccinimide but not by 2,4-dichlorophenylsuccinimide or 2,4-D. On non-synthetic agar the weak str. 2 was markedly stimulated by gibberellic acid at pH 4·5 and penicillin at 6·5. On synthetic agar cold-sterilized steer-manure extract enhanced growth of both str. at pH 4·5 and 6·5, while 2,4-D, chlorophenylsuccinimide, gibberellic acid, and penicillin did so at 6·5.

Yuen (C.) & Tan (C.). **A method for the inspection and isolation of seed-borne Verticillium from Cotton seeds.**—*Acta phytopath. sinica*, **4**, 2, pp. 121–127, 2 pl., 1958. [Chin. Abs. from Engl. summ. Received Sept. 1959.]

The seed was delinted with H_2SO_4, washed for 24 hr. in running water, and plated on 1·7% water agar to discourage faster growing fungi. After 15 days at 22° C. colonies of *V. alboatrum* [cf. **37**, 168] were observed under the low-power and spores removed and cultured. Seed infection percentages in collections from infected plants in Shensi province in 1955, –56, and –57 were 39·8, 5·92, and 9·5; in 1958 it ranged from 3–23% (av. 12) in samples from 8 co-operative farms.

Keller (G. W.). **Vermeidung von Pilz- und Bakterienbefall in der Monsunzeit in tropischen Zonen.** [Avoidance of fungal and bacterial infection during the monsoon period in tropical zones.] -*Melliand-Textilber.*, **40**, 6, pp. 674–676, 2 fig., 1959.

Of various methods tested for the control of damage by moulds, e.g., *Rhizopus nigricans* [*R. stolonifer*] and *Penicillium glaucum*, to cotton fabrics exposed to 98% R.H. and 46° C. in Bombay, India, only 1 was effective. It consisted in packing small pouches containing silica gel, $CaCl_2$, and formaldehyde round the bales, which reduced the R.H. to about 10% and prevented microbiological deterioration for at least 3 months.

Kerr (H. B.). **Physiological specialization of Melampsora lini (Pers.) Lév. in Australia.**—*Proc. Linn. Soc. N.S.W.*, **84**, 1 (389), pp. 36–63, 2 maps, 1959.

During 1948–53, 62 flax rust collections from various localities were examined in the greenhouse at Sydney Univ. [**38**, 478] from Apr. to Oct. on a differential host series comprising the 18 vars. used by Charles (Thesis Fac. Agric. Sydney Univ., 1947), supplemented by Koto, which shows promise as an immune parent, and a selection of Walsh, the only linseed var. grown commercially in Australia. Reactions were assessed after 10–14 days, following Flor's classification (*Mimeogr. Bull. U.S.D.A., N.Dak.*, 1945 [cf. **35**, 892]) as closely as possible. Each collection was tested twice, by inoculation, the method giving heavy infection being to place a drop of water on the crown of young unfolded leaves of each seedling and add uredospores, spread on the surface of water in a Petri dish, by means of a spatula.

With most vars. the condition of the host during inoculation was important, succulence being more important than age. Standardized growing conditions are thus necessary. After careful consideration of the results with each accession it was decided to recognize no more than 3 'reaction levels', viz. immune, resistant, and susceptible; a brief summary is given of those determined for the vars. used. Finally 18 races were distinguished, designated numerically. The alphabetical system of Waterhouse & Watson [**23**, 437] was abandoned owing to the frequency of new races. The reactions of each race on the differential series are listed, and a differential key is provided.

Comparison with the results of Waterhouse & Watson's earlier survey in 1941 and 1943 [**21**, 256] suggested a marked change in the rust population in Victoria (6 races new to the State) and W. Australia (5 new races, 8 new to the State), and probably also in S. Australia. Only 4 of the races identified bore any close resemblance to those encountered in previous surveys, 6 and 10 agreeing fairly closely with Charles' C and E, respectively; 2, identical with K; and 1, probably a composite of A and F, since the differential reaction for these vars. on Buda was not used. Those new for Australia were 3–5, 7–9, and 11–18.

A tabular summary is given of the distribution of the races according to State and year of collection. There was a remarkable diversity of non-Punjab-attacking (NPA) races in the flax-growing southern States, but they were completely absent from the linseed growing parts of N.S. Wales and Queensland. Newland-attacking races, widely distributed in the southern belt, had become established there before the present survey. Races attacking Ottawa 770B are recorded for the 1st time. Race 11, found in a collection of Walsh from Castleton, Victoria, in 1949, was highly virulent on the rather mixed commercial var., attacking 70% of the seedlings, but despite its virulence and the presence of an abundance of susceptible material it does not appear to have spread. Race 1, the only Punjab-attacking (PA) race identified, was the most common of the 18, being detected in 15 of the 62 collections.

In the notes on cultivated and wild hosts in Australia *Linum marginale* [**31**, 328] is mentioned as an important host. The yearly and seasonal incidence of rust was

found to be directly correlated with the availability of susceptible material: the flax acreage was approx. 61,000 acres in 1944, against 12,000 in 1948.

The most striking feature disclosed was the dichotomy of the race complex into the PA and NPA groups, a division paralleled *inter alia* by differences in temp. tolerance in the field, and of the uredospores *in vitro* [**38**, 478]. Bison was completely susceptible to all NPA races, as well as all races in America and New Zealand; it was immune from race 1. The division between the groups is not an arbitrary one such as that between Ottawa-attacking and non-Ottawa-attacking races in W. Australia, determined by a single pathogenic factor, but seems rather to be an important natural division. The distribution of the NPA group seems to be determined primarily by temp., and to a lesser extent by host: summer temps. in much of Victoria and S. and W. Australia exceed the opt. and possibly the max. level for survival of uredosori, but in the more southern sections where flax is most commonly grown the summer is mild enough to permit successful if not prolific aestivation.

The mode of survival of the 2 groups from year to year differed considerably. Within the NPA group there was little evidence that a given race maintained itself for long periods or spread to any great extent from its centre of origin: the sexual cycle is evidently of great importance in this group, and merits careful study in the field. This contrasts strongly with the history of the PA group, of which only race 1 was detected over the 4 yr.

Allowing for possible minor fluctuations there had been no change in the pathogenicity of the PA complex since 1940. This uniformity in pathogenicity is paralleled by an equally noticeable uniformity in high temp. tolerance. Whether or not the sexual cycle played a major part in the survival of the group, it was evident that race 1 aestivated quite readily as uredosori in areas where the NPA complex was suppressed, and, if susceptible hosts were present throughout the year, the race could maintain itself without difficulty in the southern states and in N.S. Wales, at least as far north as Sydney.

Strel'skaya (Mme O. Y.). Меры борьбы с антракнозом Льна. [Control measures for Flax anthracnose.]—Сборн. науч. Труд. Акад. сел.-хоз. Наук Белорусс. ССР. [*Sborn. nauch. Trud. Akad. sel.-khoz. Nauk Beloruss. S.S.R.*], *1958*, 5, pp. 319–334, 1 graph, 1958. [Received Oct. 1959.]

The best period for flax sowing in the Orsha district, Vitebsk region, as determined at the Ust'e Exp. Sta. proved to be 5–30 May. Earlier and later sowings were severely damaged by anthracnose (*Colletotrichum lini*) [*C. linicola*: **37**, 24]. At 40 kg. seed/ha. average incidence was 15·37% whereas at 180 kg. ha. it was 31·38%. Other diseases were also low when less seed was sown.

Anthracnose incidence was least in 1953 with NPK fertilizer at 20:60:60+20 tons peat/ha.; in 1954 and 1955 with 3–5 tons compost+PK (60:90) it was 9% before harvesting compared with 12·5% for no fertilizer; K fertilizers gave the decrease. Lime also decreased incidence.

Control of bacteriosis [*Pseudomonas fluorescens*: **36**, 645] was obtained only if B was added to limed soil. Liming without fertilizers, especially in wet years, can increase the incidence of anthracnose and polysporiosis [*Polyspora lini*] and in dry years also of bacteriosis.

Kuo (S.-G.) & Siang (W.-N.). **Experiments on seed disinfection for the control of Kenaf anthracnose. I. Moisture content of seed in relation to the effectiveness of hot water treatment.**—*Acta phytopath. sinica*, **5**, 1, pp. 45–52a, 1959. [Chin. Abs. from Engl. summ.]

Investigation by the Inst. Microbiol., Academica Sinica, Peking, showed that hot water treatment for the control of anthracnose (*Colletotrichum hibisci*) of kenaf [*Hibiscus cannabinus*: cf. **38**, 6] did not give consistent results with different lots

of seed, because of differences in moisture content after presoaking. Time and method of harvest, storage conditions, and exposure to direct sunlight before seed treatment may all affect water absorption during presoaking. Complete disinfection was obtained with treatment at 50° C. for 15 min. or 52° for 10 min. after presoaking at 20° for 12 hr. The moisture content of such seed was then 40%, considered to be a safety level for successful control.

Agarwal (G. P.) & Ganguli (Miss G.). **A leaf spot disease of Anogeissus latifolia Wall., due to Pestalotiopsis versicolor (Speg.) Steyaert.** - *Curr. Sci.*, **28**, 7, pp. 295–296, 1959.

At Mahakoshal Mahavidyalaya, Jubbulpore, India, in 1958, plants of *A. latifolia* were epiphytotically infected by *P. versicolor* [**28**, 489], apparently a new host record. The 1st symptoms are pinkish brown pin-head spots on either leaf surface which subsequently increase up to 12 mm. in diam. and became circular to irregular. Lesions also occur on the petioles. Mature lesions are dark brown with an ash coloured centre in which the acervuli appear. The fungus infected guava and *Carissa carandas* by inoculation.

Anzalone (L.). **Studies on flower blight of Camellia and Cercospora leaf spot of Photinia serrulata.**—*Diss. Abstr.*, **19**, 12, p. 3093, 1959.

Surface sterilization made little difference to the ease with which *Sclerotinia camelliae* was isolated from fragments of camellia petals at Louisiana State Univ. and it grew much more quickly from unsterilized. It could be isolated regularly from internal sclerotial tissue. *In vitro* ferbam, captan, and terraclor [cf. **37**, 723] suppressed mycelial growth; in soil a higher conc. of terraclor was necessary to produce the same effect as ferbam and captan but it did not lose its effectiveness so readily (15 days was the limit for the other two).

Local commercial stocks of *P. serrulata* suffer seriously from a leaf spot caused by *C. photiniae-serrulatae* [**36**, 764] which is morphologically distinct from *C. heteromeles* on *P. arbutifolia* and *C. eriobotryae* on *P. glabra*. The disease was reproduced on *P. serrulata* by inoculation with macerated mycelium or conidia of *C. photiniae-serrulatae*, but not on *P. glabra* or *Eriobotrya japonica*. Of the fungicides evaluated for controlling *C.* leaf spot, Bordeaux mixture spray suppressed the disease, tribasic $CuSO_4$, though erratic in some greenhouse tests, was excellent in the field, captan and ferbam gave good control only when inoculation occurred shortly after spraying. All Cu fungicides were somewhat phytotoxic.

Taylor (J. C.) & Muskett (A. E.). **Grey mould of Chrysanthemum flowers.**—*Plant Path.*, **8**, 2, pp. 57–59, 1 pl. (6 fig.), 1959.

In 1957 severe infection of the flower buds of Wallace chrysanthemums [cf. **31**, 384; **34**, 769] occurred in a nursery in Co. Down, Northern Ireland, on a crop protected in late Sept. by polythene sheeting and Dutch lights. In mid-Oct. there was a diffuse spotting of the first crown bud florets, often starting as elliptical lesions. Each spot involved a few red pigmented cells; the larger ones having a depressed surface. On blooms from affected buds (over 50% unmarketable) florets were damaged to various degrees. *Botrytis cinerea* was abundant on the lower leaves and was also growing on lettuce detritus adhering to the roof lights; the upper foliage was clean and healthy. Inoculations with *B. cinerea* reproduced the condition [cf. **30**, 163].

Trotsenko (I. V.). Скумпія. [The Smoke bush.]—87 pp., 16 fig., 1 map, Ukrainian Acad. Sci., Kiev, 1958. Roubles 3. [4 pp. ref.]

In the chapter on pests and diseases (pp. 79–82) of *Cotinus coggygria* [cf. **38**, 103] blotch (*Septoria cotini*) is considered the most serious; it was 1st noted in the Veseli

Bokoven'kỹ forest reservation in 1948 and has since spread rapidly in the district. Spraying with 1% $CuSO_4$ is recommended. In 1956 *Verticillium alboatrum*, *V. dahliae*, and *Fusarium* spp. were isolated from infected leaves in the Ivanivskỹ forests, Lugans'ka region. Growing potatoes, tomatoes, or vegetables between *C. coggygria* plantations should be forbidden.

Faivre-Amiot (M. A.). **Sur la présence en France de Corynebacterium fascians (Tilford) Dowson.** [On the presence in France of *C. fascians*.] –*C. R. Acad. Agric. Fr.*, **45**, 7, pp. 358–362, 1959.

Incidence of *C. fascians* [**36**, 763] on dahlia in the Paris region has increased. Inoculations established 4 new hosts: *Tagetes patula* var. Legion d'honneur, *T. erecta*, var. Guinea Gold, *Ricinus sanguineus*, and *Urtica dioica*. A natural recovery from the disease was observed when some infected plants were transferred to different soil; the bacteria in a latent state were detected in apparently healthy plants [cf. **38**, 218]. Other hosts in France are *Pelargonium zonale*, strawberry, chicory, and spinach (young seedlings). The susceptibility of dahlia vars. appears to vary from place to place.

Tompkins (C. M.). **Leaf rot of Poinsettia cuttings caused by Rhizoctonia solani and its control.**—*Plant Dis. Reptr*, **43**, 9, pp. 1036–1037, 1 fig., 1959.

In the San Francisco Bay region, during the summer and early autumn of 1958, a leaf disease of poinsettia (*Euphorbia pulcherrima*) soft wood cuttings was found to be caused by *R.* [*Corticium*] *solani* [**36**, 647]. The disease may be controlled by reducing the frequency of overhead irrigation by shortening the mist period from 1 to ½ min. and increasing the no-mist period from 1 to 1½ or 2 min., and also by reducing by half the number of daily sprayings.

Schmelzer (K.) & Schmidt (H. O.). **Die Gelbnetzkrankheit der Forsythie.** [The yellow-net disease of Forsythia.] *Phytopath. Z.*, **36**, 1, pp. 97–99, 2 fig., 1959.

In Wiederan, Kreis Rochlitz, Saxony, in 1956 a *Forsythia intermedia* bush was observed with leaves bearing a striking yellow net-like design but no crinkling or other deformation. Grafting tests with cuttings taken from shoots less than 1 yr. old, made 2 yr. later at the Inst. für Phytopath., Aschersleben, Berlin, showed that the yellow-net was infectious. This appears to be the 1st virus disease of forsythia to be reported.

Inoculations showed a str. of cucumber mosaic virus to be present, distinguished from the normal str. in that it produced a necrotic reaction in *Phaseolus vulgaris* and *Vigna sinensis*.

Willis (W. W.), Rogerson (C. T.), & Carpenter (W. J.). **An evaluation of several fungicides for control of root rot of Croft Lilies.**—*Plant Dis. Reptr*, **43**, 7, pp. 745–749, 3 fig., 1959.

At the Kans. agric. Exp. Sta., Manhattan, isolations from discoloured scales of Croft lily bulbs [**36**, p. 700] yielded 1 or more of the following fungi: *Cylindrocarpon radicicola*, *Fusarium oxysporum*, *F. solani*, *Penicillium* spp., *Colletotrichum lilii* [**38**, 522], and *Rhizoctonia tuliparum*. The first 4, together with sterile mycelium, were also isolated from root tips. Varying degrees of control (tabulated) were obtained with terraclor, captan, and Cu omadine, used as dusts on damp bulbs or mixed with the soil. Captan dusts gave the best control of root diseases and soil mixes appeared more effective in control of *C. radicicola* and *F. solani*, the 2 most prevalent fungi.

Mokritskaya (Mme M. S.). Ржавчина Роз в Ленинградской области. [Rose rust in the Leningrad region.]—Бюл. главн. бот. Сада. [*Bull. cent. bot. Gdn, Moscow*], *1958*, 32, pp. 96–105, 2 fig., 1958. [Received Sept. 1959.]

A systematic study of the life cycle of *Phragmidium disciflorum* [*P. mucronatum*:

cf. **34**, p. 80 and below] on garden roses and *P. rosae-pimpinellifoliae* on wild roses was made at the bot. Inst. Soviet Acad. Sci. Leningrad Station for Forest Protection, Pushkin. It was established that the latter species is primarily pathogenic to spp. of the sections Pimpinellifoliae and Caninae. In the Leningrad region it was also found on 6 spp. and on a hybrid of *Rosa alba* and the bush rose var. Konrad Ferdinand Meyer. Spermogonia with spermatia of *P. rosae-pimpinellifoliae* on the stems of wild roses are recorded for the 1st time in U.S.S.R. *P. mucronatum* was found to be much more widespread and pathogenic to the remontant spp. (*R. gallica*, *R. damascena*, *R. chinensis*, *R. alba*, and *R. centifolia*), as well as to a great number of wild roses. The progress of the disease and the life cycle of the fungus are detailed.

Well spaced bushes escaped infection by either rust. The vars. most susceptible to *P. mucronatum* were Frau Karl Druski, Maria Figner, Paul Neiron, Ulrich Brunner, and Henrich Munch.

The best control was obtained when spraying [loc. cit.] was combined with the application of 40–50 tons ha. of manure not too matured and P and K (2:1) at 400–500 kg. ha. Oct. spraying with 8% carbolineum or 4–5% Bordeaux mixture also gave good results.

Mokritskaya (Mme M. S.). К вопросу о понимании вида **Phragmidium subcorticium (Schr.) Wint.** [On the interpretation of the species *P. subcorticium*.]—*Bot. Zh. S.S.S.R.*, **44**, 3, pp. 386–389, 1959.

Further information [see above] is given on the rust on cultivated roses in the Leningrad region which is determined as *P. disciflorum* [*P. mucronatum*]. In teleutospore features, however, it resembles *P. subcorticium* [usually given as a syn. of *P. mucronatum*] as described by Winter (1884), which completely conflicts with *P. subcorticium* as described by Arthur (1912, 1934). The rust on wild roses in the Leningrad region fully conformed with the latter and with Dietel's description of *P. rosae-pimpinellifoliae*. Examination of many herbarium specimens showed that the label *P. subcorticium* covered several spp., most frequently *P. disciflorum*, *P. rosae-pimpinellifoliae*, and *P. tuberculatum*. As a result of experimentation on the life cycle, ecology, specialization, and variability of the rusts on roses in the Leningrad region, it is concluded that there are 2 spp. on cultivated roses, *P. disciflorum* [*P. mucronatum*] and *P. dietelianum* (syn. *P. tuberculatum*), and 1 on wild roses, *P. rosae-pimpinellifoliae*. *P. subcorticium* is considered to be a collective sp. It is thought that most probably both Schrank, who first used the epithet, and Winter were describing *P. disciflorum* under the name *P. subcorticium*. Sydow speaks correctly of the replacement of the name *P. subcorticium* by *P. disciflorum*. Tranzschel [**19**, p. 167] also indicated *P. subcorticium* non-Arthur to be a synonym of *P. disciflorum*, and *P. subcorticium* emend. Arthur of *P. rosae-pimpinellifoliae*.

Mokritskaya (Mme M. S.). Специализация ржавчины на видах и сортах **Rosa L.** в условиях Ленинградской области. [Rust specialization on species and vars. of *Rosa* in the conditions of the Leningrad region.]—*Bot. Zh. S.S.S.R.*, **44**, 6, pp. 830–836, 1959.

Specialization of *Phragmidium rosae-pimpinellifoliae* [see above] was studied in 1954–6 under natural conditions (5 repetitions) by inoculation of 2–3 yr. seedlings of 18 wild rose spp. and also rose cultivars, using inoculum of aecidiospores and uredospores from dog rose. *R. gallica* and *R. chinensis* were not infected; *R. woodsii*, *R. rugosa*, *R. marretii*, and *R. pomifera* were only weakly infected (blotches with few pustules and no multiple aecidia). Pathogenicity is wide in *P. disciflorum* [*P. mucronatum*], many spp. of roses being infected; the full life cycle is completed on hybrids. *P. mucronatum* is a much more widespread sp. than *P. pimpinellifoliae*.

Lyalina (Mme A. S.). Об устойчивости Роз к инфекционному 'ожогу'. [On the resistance of Roses to infectious 'burn'.]—Бюлл. главн. бот. Сада [*Bull. cent. bot. Gdn, Moscow*], *1959*, 35, pp. 103–105, 1959.

In the course of observations on the infection of roses by *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*] and *C. wernsdorffiae* [**36**, 587] in 1955–6 in the Botanical Garden, data were obtained relating to 20 groups and 718 vars. (1,623 plants). There were no signs of 'burn' in the following groups: Pimpinellifolia (7 vars.), Centifolia × Moschata (3 vars.), Rubiginosa hybrida (6 vars.), Rugosa (13 forms), Rugosa hybrida (18 vars.). In addition, up to 75 spp. had no external signs of infection.

Hackbarth (J.). **Betrachtungen über die Mosaikkrankheit der gelben Lupinen.** [Observations on the mosaic disease of yellow Lupins.]—*Züchter*, **29**, 1, pp. 59–63, 1959. [23 ref.]

In this review of the literature on lupin mosaic virus [**32**, 319] from the Max Planck Inst. für Züchtungsforschung, Köln-Vogelsang, the author states that the causal virus is very probably bean yellow mosaic virus [cf. **35**, 772; **37**, 483]. First observed in Germany 10–15 yr. ago, the disease is assuming increasing importance in all lupin growing areas. Little is known about resistance or tolerance, and hardly anything about their mode of inheritance [cf. **34**, 652]. An important point in progeny tests is transmissibility by seed; the resistant parent would therefore have to be used as the female in crosses, but there still remains the possibility of the virus being pollen-borne. The F_1 must be raised virus free.

Smith (J. D.). **Fungal diseases of turf grasses.**—90 pp., 15 fig., The Sports Turf Research Institute, Bingley, Yorks., 1959. 10*s*. 6*d*. [141 ref.]

Much of the information brought together in this useful publication has already been noticed [**37**, 590–591; **38**, 603–604, *et passim*]. The 1st part deals with the principles of turf disease control and covers the effect of environment of grass spp. and vars., and of cultural practices on the incidence of disease: it concludes with a section on the general methods of control by fungicides. The 2nd part deals with individual diseases, symptoms, causal organisms, and specific control measures. The behaviour of a number of turf grasses towards common diseases is tabulated and a disease control chart is included.

Doling (D. A.) & Hepple (Shirley). **Occurrence of take-all in Cocksfoot and other Grasses.**—*Plant Path.*, **8**, 2, pp. 73–75, 1959.

In May 1957 patches of plants killed by *Ophiobolus graminis* [**38**, 603, 604] were found in several cocksfoot (*Dactylis glomerata*) seed crops of vars. S. 37, S. 143, and Scotia, in the Holland Division, Lincs.; the biggest was about 15 yd. diam., but most were 2–4 yd. across. One crop of timothy (*Phleum pratense*) was also affected. Wild *Bromus sterilis* and *Lolium perenne* in the field were severely infected. Whiteheads and runner hyphae were present in a seed crop of meadow fescue (*Festuca pratensis*) S. 215 in Warwickshire in 1958 and in Blenda and S. 172 oats in Worcs. following a 6 yr. grass-clover ley. Cross inoculations demonstrated the ease with which the oat strain infected wheat, barley, and grasses. These observations demonstrate that the intrinsic susceptibility of grasses is important, both owing to possible carry-over to cereals [**38**, 319] and loss in pure stands grown for seed.

Sprague (R.). **Some leafspot fungi on Western Gramineae—XII.**—*Mycologia*, **50** (*1958*), 6, pp. 814–830, 2 fig., 1959. [27 ref.]

This contribution [cf. **37**, 494] is based largely on a study of diseased grasses collected in the far west of the United States; 39 taxa are listed and annotated, including one new genus and 4 new spp. *Claviceps purpurea* is common in Calif.

on *Elymus cinereus* but not, apparently, hitherto reported; *Fusarium nivale* [*Calonectria nivalis*] was present on narrow, brown lesions on the sheaths, culms, and leaves of living *Festuca viridula* growing in Okanogan and Chelan counties, Wash., under cool wet conditions in Aug. 1957; *Helminthosporium cynodontis* affected *Cynodon dactylon* in lawns at Phoenix, Ariz., and *H. siccans Lolium perenne* at Chapingo, Mexico; also recorded are *Rhynchosporium secalis* [**38**, 140] on *Bromus vulgaris* in Chelan county, Wash., and on *B. inermis* in Utah, where it was abundant on several other grasses; *Septoria avenae* [*Leptosphaeria avenaria*: **38**, 256], abundant on *Glyceria* spp. in swampy areas in Pend Oreille county, Wash., and in the adjacent Bonner county, Idaho, in late June and early July, 1957, also in Oregon; and *Septoria passerinii* [**37**, 463] on *Poa pratensis* in Oak Creek Canyon, Ariz. (new record), in Sept. 1957. The genus *Muirella* Sprague is distinguished from *Gloeocercospora* and *Ramulispora* in having spores fused at the base in pairs produced on a deep-seated sporodochium.

The name *Hendersonia graminis* is preferred to *Wojnowicia graminis*.

Kišpatić (J.) & Milatović (Ivanka). **Glavnica (Claviceps paspali S. et H.) na divljem Troskotu u dolini Neretve.** [Ergot (*C. paspali*) on wild 'Troskot' in the Neretva Valley.]—*Acta bot. croat.*, **17**, pp. 99–112, 1 pl., 5 fig., 1958. [Fr., Germ. summ. Received Oct. 1959.]

The Forestry Inst. Zagreb, Yugoslavia, reports *C. paspali* [cf. **32**, 257, 279] on *Paspalum distichum* ssp. *paspalodes*, which is extending in the area, heavy infection being a serious hazard for grazing cattle. Heavy rainfall and flooding are held responsible for the rapid spread of the grass and hence the fungus.

Bos (L.), Delević (B.), & Van der Want (J. P. H.). **Investigations on White Clover mosaic virus.** *Tijdschr. PlZiekt.*, **65**, 3, pp. 89–106, 8 fig., 1959. [Dutch summ.]

White clover mosaic virus (WCMV) in the Netherlands was demonstrated in previous work at Wageningen [**35**, 260] to be not a complex of viruses [cf. **21**, 293; **37**, 495] but a single virus [cf. **38**, 87]. As it appeared to be related to the virus described by Quantz [**36**, 409] and to Trifolium virus 1, in the present study Zaumeyer and Wade's virus [**15**, 275] was compared with the Dutch isolates WKV from white clover, ER from peas showing necrosis, TRV from red clover with mosaic symptoms, and DEL, isolated together with pea mosaic virus from peas, in which WCMV manifested itself by inducing a severe wilt in autumn greenhouse studies under poor light. There were no evident differences between these isolates. French bean (*Phaseolus vulgaris*: 8 vars.), pea (12 vars.), *Trifolium incarnatum*, *T. pratensis*, *T. repens*, broad bean, *Vigna sinensis* and cucumber were susceptible to them, but not runner bean (*P. coccineus*: 2 vars.), *Dianthus barbatus*, carnation, *Gomphrena globosa*, or spinach. Symptoms in the susceptible hosts are described in detail; the virus is stated to be very infectious, transmission occurring even by contact. Transmission by *Cuscuta campestris* was confirmed and the virus was demonstrated in it. *Acyrthosiphon pisum*, *Myzus persicae*, and *Aphis fabae* did not transmit even after long starvation and short infection feeding periods. The physical properties of the virus were in general agreement with data already published, as was the size of the filiform particles (approx. 475 mμ). All 4 Dutch isolates reacted similarly to antiserum.

Van der Want (J. P. H.) & Bos (L.). **Geelnervigheid, een virusziekte van Luzerne.** [Vein yellowing, a virus disease of Lucerne.]—*Tijdschr. PlZiekt.*, **65**, 3, pp. 73–78, 1 pl., 1959. [Engl. summ.]

The disease here described from the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, was 1st seen at Wageningen in 1950, and in subsequent years

has been observed in a number of fields there, where it appears to spread rapidly. It is prevalent in lucerne in the S.W. Netherlands, where tip yellows (pea leaf roll virus) [**37**, 748] is prevalent in peas. The symptoms are a regular light green to yellow discoloration of the veins and adjacent tissue, without malformation of the leaves. Pea leaf roll virus was isolated from 4 out of 5 infected plants and experimentally transmitted from pea to lucerne by *Acyrthosiphon pisum*, symptoms taking several months to appear. The environment is of great importance in determining symptom expression, and in general vein yellowing is very striking in the spring and late autumn, but not in evidence in the summer. It is concluded that lucerne is an important host of pea leaf roll virus [cf. **35**, 144].

Renfro (B. L.) & Sprague (E. W.). **Reaction of Medicago species to eight Alfalfa pathogens.**—*Agron. J.*, **51**, 8, pp. 481–483, 1959.

Thirteen perennial spp. of *M.* were tested in nurseries in 3 plant plots, spaced 1 ft. apart, at 2 locations at the Minn. agric. Exp. Sta., Rosemount, and at 2 at St. Paul, as well as in the bacterial wilt nursery. They were inoculated with *Corynebacterium insidiosum* [cf. **37**, 102; **38**, 753] in May 1957. *M. arborea* showed no internal or external symptoms of bacterial wilt. Inoculation of the perennial spp. in the greenhouse in 1957 with a conidial suspension of *Phoma herbarum* var. *medicaginis* [**38**, 412] from 31 isolates indicated a high degree of resistance in *M. suffruticosa* and *M. dzawkhetica* in greenhouse and field; these 2 spp. were also quite resistant to other diseases for which they were tested. Annual spp. (26) had little if any resistance to the black stem complex (predominantly *P. h.* var. *medicaginis* [**38**, 753], *Pseudoplea briosiana*, and *Colletotrichum destructivum* in that order); in addition *Pleospora herbarum* and *Cercospora zebrina* were associated with stem blackening in many collections. Leaf symptoms of the diseases in all spp. were very similar; no differences were observed between isolates of the different fungi from stems and leaves of different host spp.

Schmiedeknecht (M.). **Beitrag zur Eigenschaftsanalyse der Resistenz verschiedener Medicago-Arten gegen Pseudopeziza medicaginis (Lib.) Sacc.** [Contribution to the analysis of the properties of resistance of various *M.* spp. to *P. medicaginis*.]—*Züchter*, **29**, 2, pp. 65–72, 3 fig., 1959.

In further studies [**38**, 88] at the Inst. für Phytopath., Aschersleben, Germany, active resistance to f.spp. *medicaginis sativae* and *medicaginis lupulinae* [**38**, 87] was demonstrated by normergic and hyperergic defence reactions, the former a feature of the plasma and also expressed by wall thickening and the latter characterized by necrogenesis and gummous demarcation. The normergic are specific and immediate whereas the hyperergic are more generalized and develop after some delay. The cells of various tissues in a single plant differ quantitatively in the strength of their reactions, the palisade tissue and guard cells being particularly weak.

Spp. with a high degree of resistance to both f.spp. [loc. cit.] included *M. hispida* ssp. *macrocarpa* and f. *breviaculeata*, *M. minima*, and *M. murex*. Resistance to f.sp. *medicaginis sativae* was shown by *M. hispida* ssp. *microcarpa* and f. *denticulata*, *M. lupulina*, and *M. turbinata*, and to f.sp. *medicaginis-lupulinae* by *M. ciliaris*, *M. falcata*, *M. globosa*, *M. orbicularis*, lucerne, *M. trunculata*, *M. tuberculata*, and *M. varia*. Sporulation of both f.spp. was prevented on *M. rigidula* and *M. scutellata*.

Current research and investigation.—*Orchard. N.Z.*, **32**, 8, p. 241, 1959.

A detailed inspection at Levin in 1958–9 of apple stocks for apple mosaic virus [**38**, 118] showed Merton 793 stool beds to be free from infection, 1 diseased plant

was found among Northern Spy, and as there was a sprinkling of infection in Malling stocks infected stools were destroyed. Heat treatment against apple mosaic has been improved by the discovery that infected buds will unite with healthy seedlings even when placed in a cabinet at 100° F. within ½ hr. of insertion.

More evidence collected points to the effectiveness of Cu oxychloride [**38**, 606] against spp. of *Phytophthora* and *Pythium* in the soil; while artificial fertilizer dressings were ineffective, Cu oxychloride markedly reduced the survival of *Phytophthora* sp. in boxes of soil held under glass. Field trials in Nelson and Marlborough show the same trend as reported last year; though more apple trees have died in untreated plots than in treated, the results are not yet outstandingly in favour of Cu treatment, the application of which is not simple; 1½ lb. may kill a young tree. Poor tree growth on infected soils may be due, at least in part, to the killing of rootlets by *P.* without any obvious collar or trunk symptoms. Cox's Orange has proved most susceptible to collar rot of all vars. commonly grown in New Zealand. Granny Smith has considerable resistance.

Jaarverslag 1958 Proefstation voor de Fruitteelt in de volle grond. [Report for 1958 of the Experiment Station for Outdoor Fruit Culture. Wilhelminadorp, Netherlands.]—93 pp., 24 fig., 1959. [Engl. summ.]

In the mycological section (pp. 36–43) [cf. **38**, 213] G. S. Roosje reports further studies on infection periods of apple scab (*Venturia inaequalis*). When nursery plants of the susceptible M[alling] II stocks were exposed to conidial infection partly germinated conidia could survive a dry period of 4–15½ hr. between 2 wet leaf periods, each by itself insufficient to permit infection. In determining infection periods any 2 wet periods having an interval between them of not more than 8 hr. should, therefore, count as a single wet period. In fungicidal trials on M II exposed to conidial infection the curative action of 0·05–0·12% cyprex [cf. **38**, 13, 386] was often insufficient 48 hr. later but concs. of 0·15–0·25% had satisfactory curative action, equal to that of 0·07% aaventa; the leaves and fruits of the pear vars. Précoce de Trévoux and Clapp's Favourite were damaged at the higher levels (0·2%). In laboratory tests 0·2% aacuram (containing cetylpyridinium dimethyldithiocarbamate) had a curative action roughly equal to that of 0·15–0·25% cyprex, but was also liable to damage leaves and fruit.

In further work on the effect of temp. and humidity on *Podosphaera leucotricha* infection, in which 'climatic chambers' (180 × 190 × 185 cm.) were used, conidia caused infection over wide ranges of temp. and humidity; the incubation period was 6–7 days. Some 18–27% of the fruits of heavily infected Jonathan trees [**38**, 754] showed reticulate russeting, compared with 6–10% on those with mild infections.

Phytophthora cactorum was isolated from Ellison's Orange, in which it had caused a collar rot lesion similar to those seen in Cox's Orange. When tested *in vitro* in potato agar against the fungus captan was more active than Cu oxychloride, cyprex, or brestan (all at 100 p.p.m. active substance).

Videnov (B.). Струпясване по Ябълката. [Apple scab.] Овощарство [*Ovoshtarstvo*], **6**, 3, pp. 31–33, 1959.

The Kyustendil Fruit Growing Inst., Bulgaria, reports that apples of vars. with elongated fruit are very often cracked and deformed when infected by *Venturia inaequalis*. The loss of yield locally has reached 10% in the last few yr. because susceptible vars. are grown. The introduction of Knyazheva zelena and Jonathan is recommended. Control [**37**, 539] was best achieved with one 1% Bordeaux spray before flowering and two 2% lime-sulphur sprays after flowering. Autumn spraying with 1·5–2% selinon [cf. **36**, 481] is also recommended.

Woodhead (C. E.). **Powdery mildew of the Apple.**—*N.Z. J. Agric.*, **99**, 1, pp. 53. 55–56, 4 fig., 1959.

A description in popular terms of powdery mildew (*Podosphaera leucotricha*) and its control [**38**, 239]. This disease is prevalent all over New Zealand, but causes the greatest damage in Marlborough, Canterbury, and the Central Otago regions.

Kosswig (W.). **Studies on the overwintering of powdery mildew Podosphaera leucotricha (Ell. et Ev.) Salm.** *Höfchenbr. BayerPflSch. Nachr.*, Engl. Ed., **11**, 1, pp. 14–24, 1 fig., 1 graph, 1958.

A more detailed account is given of observations from late summer 1956 until spring 1957 on 2,792 annual long shoots on 130 Jonathan apple trees at the Höfchen Res. Sta., Leverkusen, Germany [**38**, 754]. Buds and branches differ in their disposition to *P. leucotricha* [**38**, 265]. On combining the percentages of infected and dead buds it was found that branches where the bud scales did not close properly, i.e. with a split terminal bud (A-branches), were infected more often than those with a closed terminal bud (G-branches). This difference is evident as far as the 4th bud. The ability of both branch groups to display defensive reactions varies in the same manner. More terminal and 1st axillary buds die on A- than on G-branches. For buds which survive infection and those which are infected on emerging in spring the percentage of infection is significantly greater on A-branches up to the 6th bud. The extent of infection, therefore, governs the reaction of the different buds on a branch and largely determines whether the terminal bud closes or remains open. The buds and the growing cone are infected mainly by conidia. The reaction of the terminal bud is probably determined by the infection and reaction of the axillary buds.

The crucial months for control (peak of conidial production and opt. for infection) are May and June. Alternatively cutting out the terminal and 1st axillary bud in winter, with special attention to split buds, and pruning primary infected shoots in Apr. are recommended.

Sharples (R. O.). **Further orchard sources of infection by Gloeosporium spp.**—*Plant Path.*, **8**, 2, pp. 71–72, 2 fig., 1959.

In further studies at Long Ashton Res. Sta. of bitter rot of stored apples, caused by *G.* [*Neofabraea*] *perennans* and *G. album* [**38**, 528], it was found that saprophytic infection of mummified Cox fruitlets constituted an important source of infection, and that leaf scars of Cox can become infected by *N. perennans* at leaf fall, resulting in cankers the following year [cf. **1**, 106].

Miller (P. M.). **Open calyx tubes as a factor contributing to carpel discoloration and decay of Apples.**—*Phytopathology*, **49**, 8, pp. 520–523, 2 fig., 1959.

Studies at Conn. agric. Exp. Sta., New Haven, of the sporadic occurrence of discoloured and mouldy carpels [cf. **22**, 69] in Wagener and Red Delicious apples showed a common extension of the calyx tubes into the carpels in affected fruit. Of the fungi isolated *Fusarium* sp., *Botrytis* sp., *Alternaria* sp., and *Aspergillus niger* were all able to produce some discoloration on injection into the carpels, as also were a mycelial extract of the *Botrytis* sp. and a number of spray materials. A wetting agent (tween 20) entered a carpel in 20 min. via an artificial opening less than 25 μ diam. Of 26 vars. examined, 10 had calyx tubes open to the carpels or had a deep sinus or pit; vars. with this character should be avoided. It is suggested that abnormally fast growth following heavy rain may cause rupture of the calyx tubes and contribute to the condition.

Lewis (F. H.) & Hickey (K. D.). **Some new information on black knot and brown rot of Plums.**—Abs. in *Phytopathology*, **49**, 8, p. 524, 1959.

Infection of plums by ascospores of *Dibotryon morbosum* [in Pennsylvania: cf. **29**, 461; **38**, 386] occurred from the beginning of annual growth until after blossoming on the new tissues of spurs and terminals and new knots appeared in July. Successful knot pruning must include all diseased tissue: on large limbs the wounds should be painted with 200 p.p.m. actidione in water.

Captan, dichlone, and Hg were very effective against *D. morbosum* and *Sclerotinia fructicola* [**31**, 388] in spore germination tests, and S, though less effective in these, gave good field control. Field trials with Stanley prune resulted in good to fair black knot control with zineb, niacide-M, Hg, S, ferbam, captan, and dichlone in this order. Only captan, dichlone, and Hg controlled *S. fructicola* blossom blight. Captan was non-phytotoxic, but leaf injury was caused by Hg in the 1st post-blossom spray and by dichlone in the 2nd, and fruit injury by dichlone in the 3rd.

Fridlund (P. R.). **Time and temperature requirements for the transmission of the necrotic ring spot virus of Prunus.** - *Plant Dis. Reptr*, **43**, 9, pp. 993–995, 2 graphs, 1959.

The time required for transmission of [peach] necrotic ring spot virus [cf. **33**, 678; **38**, 756] from infected buds of *Prunus tomentosa* and *P. mahaleb* to healthy *P. tomentosa* was shown to depend upon temp. at the Irrigation Exp. Sta., Prosser, Wash. Buds were chip-budded onto potted yearling plants about $\frac{1}{4}$ in. caliper and removed at 24-hr. intervals, beginning after 72 hr. contact. At 30° C. the time required was 72 hr., whereas at 18° it was 168 hr. The virus culture used and the host had some influence on the rapidity of transmission, but probably neither is very important.

Fulton (R. H.) & Cation (D.). **Destruction of inoculum or possible transmitting agent of Peach rosette mosaic virus by soil drenching with chlordane.** —*Plant Dis. Reptr*, **43**, 9, pp. 991–992, 1 fig., 1959.

At Mich. State Univ., E. Lansing, Halehaven peach seedlings were potted in soil samples from the root environment of peach trees with severe symptoms of peach rosette mosaic virus [**30**, 329], 1 lot of 16 being drenched with tap water, the other with a 0·5 [%] solution of chlordane. No symptoms of the disease were evident during the 1st growing season or in the chlordane-drenched in the following year, when 14 of those in untreated soil developed rosette mosaic.

Breece (J. R.) & Hart (W. H.). **A possible association of nematodes with the spread of Peach yellow bud mosaic virus.** *Plant Dis. Reptr*, **43**, 9, pp. 989–990, 1959.

At Calif. Dept Agric., Sacramento, nematodes (believed to be *Xiphinema americanum*), recovered by the sieve method from soil round peach trees infected by yellow bud mosaic virus [**37**, 92], were applied to the roots of healthy seedlings (120 to 1 seedling and 90 to 4) in clean soil in 1 gal. cans; severe symptoms of the disease appeared 5–10 months later.

Kemp (W. S.). **Zinc deficiency of Newcastle Apricots.** *Orchard. N.Z.*, **32**, 8, pp. 219, 221, 4 fig., 1959.

Treatment in Feb. 1953 of a block of 4-yr.-old Newcastle apricot trees in Clyde-Cromwell Gorge with either $ZnSO_4$ or $Mn_2(SO_4)_3$, both + hydrated lime, following the appearance for the 1st time of Zn deficiency symptoms [**35**, 614] in 1952, produced a reduction in leaf chlorosis following $ZnSO_4$. After a further $ZnSO_4$ spray in the autumn over the whole block, only very mild symptoms, confined to trees seriously affected in the previous season, were apparent in 1954. As symptoms

began to reappear the next season further treatments were given in Feb. and Nov. 1955 but were unsuccessful, owing to the fact that the material supplied as $ZnSO_4$ was not true to the label. In Feb. 1956 a further series of treatments caused a marked reduction of chlorosis and by the spring none was evident on trees treated with Zn alone or in combination with Mn or Fe. In 1957 there were slight symptoms here and there. Severely affected trees carried very few fruits which were much smaller than the normal ones. Newcastle appeared to be the most susceptible var.

Tsakadze (T. A.). Действие токсина **Cytospora leucostoma** на клетку растения. [The action of the toxin of *Valsa leucostoma* on the plant cell.]—Бюлл. главн. бот. Сада [*Bull. cent. bot. Gdn, Moscow*], *1959*, 35, pp. 75–77, 2 fig., 1959.

In the course of studies on the wilting of stone fruit trees, a very widespread disease in Georgia, it was established that the causal agent (*V. leucostoma*) [cf. **38**, 397] secretes toxic substances, which inhibit the growth of some fungi. The toxin was extracted from liquid cultures and tested on *Coleus* shoots. The toxin raises plasma permeability and polyphenoloxidase activity, peroxidase is strongly activated, elimination of lipoids from the plasma takes place, respiration is increased, and the respiratory coefficient falls. A gum-like substance appears in the vessels during the first 24 hr., after which they become clogged. Necrosis develops in the stem tissues, beginning in the bark and gradually invading the whole tissue of the stem, so that the shoot wilts and dies.

Vukovits (G.). **Können Johannisbeeren und Zwetschken vor Rostpilzbefall geschützt werden?** [Can Currants and Prune plums be protected against attack by rust fungi?]—*Pflanzenarzt*, **12**, 4, pp. 42–44, 4 fig., 1959.

A popular note on rust infection of currants [*Cronartium ribicola*] and prune plums [*Tranzschelia pruni-spinosae*] in Austria [**37**, 411] with indications for control by zineb.

Zakhryafina (Mme T. D.). Дифференциация возбудителя антракноза Смородины и Крыжовника. [Differentiation of the causal agent of anthracnose of Currants and Gooseberries.]—*Bot. Zh. S.S.S.R.*, **44**, 6, pp. 836–843, 1 fig., 1959.

Affected leaves were collected from gooseberries and currants –black, red, golden (*Ribes aureum*), and alpine (*R. alpinum*)—in the Leningrad region, and conidia of the *Gloeosporium* state of *Pseudopeziza ribis* measured. Analyses of measurements of these and of apothecia from overwintering leaves of gooseberries and black and red currants revealed differences which indicated the existence of intraspecific differentiation. Conidial cultures from leaves of gooseberry and black and red currant differed in colour of mycelium and rate of development. Opt. temp. for mycelial development was close to 18° for the black currant isolate and close to 21° for the gooseberry, while that from red currant made good growth at both temps. The temp. limits for the discharge of ascospores were 5 and 27°, with an opt. for the black currant isolate at 19°, red currant at 19–23°, and gooseberry at 23°. Opt. temp. for conidial germination was *circa* 16° for those from red and black currants, and *circa* 19° from *R. alpinum* and gooseberry. Cross inoculations of 120 plants (12 different berry plant spp.) were made at the Pushkin orangery of the All Union Plant Protection Res. Sta. with ascospore and conidia inoculum of different origins.

Spores from any single sp. of *Ribes* were specific to a range of plants. Incubation periods and degree of infection depended on the nearness of genetic relationship of source plant to inoculated plant. Spores from black currant were more aggressive to black currant than to red or gooseberry. Thus the strains from the different

hosts differed in a number of morphological, biological and physiological characters. The existence of 3 forms, *P. ribis* f.sp. *nigri*, f.sp. *rubri*, and f.sp. *grossulariae* [**36**, 253] was confirmed, but reciprocal infection of different spp. in plantations is fully possible. Conidia from golden currants infected a larger range of berry plants than those from black currants or other spp., though they are practically identical morphologically; a f.sp. *aurei* is suggested. Furthermore conidia from wild gooseberry (*Grossularia divaricata*) with a common host range differ from those from gooseberry var. Industriya by their ability to infect red currant. Conidia from *R. vulgare* var. Krasnÿi Krest, which are similar in properties to those from the wild red currant, differ from them in their inability to infect *R. alpinum*, while those from *R. alpinum* differ from all the rest morphologically, being thinner and less curved. These differences, however, are not more pronounced than those between conidia from the other berry plants; therefore f.sp. *alpini* is proposed. This form showed a somewhat greater adaptation to its own host than isolates from other berry plants. However, its conidia infected alpine, golden, and red currant. Even *R. alpinum* became freely infected with conidia from red currant.

Brauns (Mechtild). **Beitrag zur Züchtung mehltauresistenter Stachelbeeren. I. Untersuchungen über die Vererbung der Resistenz und die Anwendungsmöglichkeiten der Frühselektion.** [Contribution to the breeding of Gooseberries resistant to mildew. I. Studies on the inheritance of resistance and the possibilities of application of early selection.] –*Züchter*, **29**, 1, pp. 51–57, 7 fig., 1959.

At the Inst. für Acker- und Pflanzenbau, Müncheberg/Mark, Berlin, the progeny of diallelic crosses between the Müncheberg gooseberry clones 38,63,3, 38,88,8 (Perle der Mark), 38.90,1, and 38.92,3 (mostly from crosses involving Gold Kugel as 1 parent) and the vars. Lady Delamere, Hönings Früheste, Rote Triumphbeere, and Rote Preisbeere were tested for their reaction to *Sphaerotheca mors-uvae* [**37**, 173; **38**, 324]. All susceptible plants were eliminated from the tests at an early stage by using Bauer's mass infection method [**18**, 402]. Seedlings with 0–30% susceptibility were retained. The varying results indicate that inheritance is more complicated than has been hitherto recognized. It is suspected that with the prevalence of susceptibility the resistance alleles are additively strengthened until they are capable of producing resistance, even though heterozygous. From microscopical examination of young leaves in the greenhouse it was apparent that fully resistant plants maintain their status even under conditions favourable to artificial infection. Resistance is based on hypersensitivity of the epidermal cells. Field resistant plants were slightly infected under the conditions employed in the greenhouse.

Hårdh (J. E.). **Pensasmustikan viljelyä haittaavista tekijöistä Suomessa.** [Factors affecting Blueberry culture in Finland.] –*Maataloust. Aikakausk.*, **31**, pp. 131–140, 7 fig., 1959. [Engl. summ.]

During an investigation which has been in progress since 1947 the most serious disease of *Vaccinium corymbosum* was canker (*Godronia cassandrae*) [cf. **37**, 727]. Isolates from conidia and ascospores produced only sporodochia after 90 days in culture on oatmeal agar. Jersey was the most susceptible var., Rancocas and Rubel showing no symptoms.

Botrytis cinerea caused leaf spotting in September, too late to be of much importance, mostly on vars. Burlington, HBS 109, June, and Stanley.

A virus-like disorder, differing from any reported from U.S.A. on blueberries, caused on var. June a pale green mosaic or pale green and yellow striping and narrowing of the leaves, which were often asymmetrical. The results of inoculation tests were negative.

Stoyanov (D.). Една нова болест по Малината у нас. [A new disease on Raspberry in our country.]—*Bull. Plant Prot., Sofia*, **7**, 1/2, pp. 56–59, 1 fig., 1958. [Russ. summ.]

A detailed account of the occurrence of *Didymella applanata* on raspberry in Bulgaria [**37**, 515], where the disease was 1st noticed in 1956, though it must have been present for some years. Wounds caused by *Thomasina theobaldii* form infection courts both for this pathogen and *Leptosphaeria coniothyrium* [map 185], though *D. applanata* alone attacks only buds, leaves, and petioles. The disease is spreading rapidly, causing damage in some areas assessed at 52–98% loss of crop.

Miller (P. W.). **Outbreak of witches' broom disease in Puget Beauty Strawberry in Oregon.**—*Plant Dis. Reptr*, **43**, 9, pp. 996–997, 2 fig., 1959.

In Feb. 1959 in Clackamas county, Ore., strawberry witches' broom virus [**35**, 832], not observed in the area since 1927 [**6**, 673], was again found, confined to the Puget Beauty var. in 1 field. The symptoms were transmitted to *Fragaria vesca* var. *alpina* seedlings and to plants of var. Marshall by leaf-petiole grafting [**38**, 93].

Nelson (K. E.), Maxie (E. C.), & Eukel (W.). **Some studies in the use of ionizing radiation to control Botrytis rot in table Grapes and Strawberries.** *Phytopathology*, **49**, 8, pp. 475–480, 4 fig., 2 graphs, 1959.

In studies by the Univ. Calif., Davis, and the appl. Radiation Corp., Walnut Creek, Calif., fruit of Tokay, Emperor, and Thompson Seedless grapes and Shasta strawberries [**36**, 410] was irradiated at 5×10^4, 1×10^5, 2×10^5, 4×10^5, and 8×10^5 rep by means of an ARCO Model 1 Mark 1 electron linear accelerator, either in single layers, from above only, or (small grape clusters) in 2 lb. consumer packages, from above and below. The use of β particles instead of gamma rays [**38**, 704] was considered to be a more practicable proposition.

Thompson Seedless grapes showed no injury after irradiation at 2×10^5 rep unless cold stored previously, when they were somewhat more susceptible. After 4×10^5 rep the fruit turned slightly brown and had a faint 'cooked' colour and flavour. Tokay and Emperor fruit appeared less easily damaged, injury being masked by their pigmentation. Shasta strawberries also withstood 2×10^5 rep, but higher doses caused increasing injury.

Irradiation of cultures of *B. cinerea* at 1×10^5 rep slowed growth for 11 days, compared with the controls; after 2×10^5 rep growth was very slow for 11 days, ceased until the 18th, and then returned to normal. Higher dosage rates resulted in permanent cessation of growth. When infected and healthy grapes or strawberries were closely intermingled, 1×10^5 rep markedly retarded contact infection, doses above 2×10^5 giving little additional control. It would appear that the temporary effect of fungistatic doses that do not injure the fruit may offer practical increases in the postharvest life of the fruit.

Frossard (P.). **Présence de Cercospora mangiferae Koorders sur la côte d'Afrique.** [The presence of *C. mangiferae* on the African coast.]

Viennot-Bourgin (G.) & Comelli (A.). **Le Cercospora du Manguier au Congo (Cercospora mangiferae Koorders).** [The *Cercospora* on Mango in the Congo (*C. mangiferae*).] —*Fruits d'outre mer*, **14**, 4, pp. 182–184, 3 fig.; 6, pp. 267–270, 3 fig., 1959.

At the Inst. franç. Rech. fruit. outre-mer, at Foulaya, Guinea Republic, in 1955 *C. mangiferae* was recorded for the 1st time on a young mango tree. Its reported occurrences elsewhere are noted [cf. **32**, 367]. By 1957 the attack seemed to spread widely on most of the grafted vars. but was restricted to the leaves.

The second paper reports the occurrence of *C. mangiferae* at Loudima, Middle

Congo, in Jan. 1958, on mango fruits. The economic importance of the disease is negligible in plantations regularly treated with Cu compounds against anthracnose (*Glomerella cingulata*) [cf. **31**, 443].

Andrade (A. C.). **Novo fungicida para controlar a ferrugem da Goiabeira.** [New fungicide for the control of Guava rust.] *Biológica*, **25**, 8, pp. 178–179, 1959.

In recent experiments in São Paulo, Brazil, *Puccinia psidii* [**31**, 391] on 2-yr.-old trees was combated with equal efficiency by 1% Bordeaux mixture and 0·3% B 03818 (Röhm and Haas; reported to be a combination of $NiCl_2$ and zineb).

Corbett (M. K.). **Diseases of the Coconut Palm. IV. Bud rot.**—*Principes* (*J. Palm Soc.*), **3**, 4, pp. 117–120, 3 fig., 1959. [9 ref.]

The symptoms and control of coconut bud rot (*Phytophthora palmivora*) [cf. **37**, 7; **38**, 485] are briefly described.

Pamcho (J. V.). **The 'Tambulilid' dwarf Coconut.** *Principes* (*J. Palm Soc.*), **3**, 4, pp. 120–121, 1 fig., 1959.

Because of the widespread devastation caused among coconut palms in the Bicol region (Albay, Camarines Norte, Camarines Sur, Sorsogon) of the Philippine Islands by cadang-cadang disease [**37**, 519], local growers are planting the dwarf var. Tambulilid, which is believed to be resistant.

Baldacci (E.). **Esame dello stato sanitario di discendenze clonali di Patate coltivate in pianura e in montagna.** [An investigation of the health of clonal progenies of Potatoes grown in the plain and in the mountains.]—*Sementi elett.*, **2**, pp. 36–42, 4 fig., 1958. [Engl., Germ. summ.]

A preliminary account of an investigation carried out from 1953–57 in Italy to ascertain the effect of climatic, altitude, nutritional, and pathological factors upon degeneration diseases [cf. **36**, 718]. A more detailed paper is to follow.

Synchytrium endobioticum (Schilb.) Perc. Potato wart disease in Europe and the Mediterranean Basin in 1958. 10 + ix pp., Paris, European and Mediterranean Plant Protection Organisation, 1959. [Fr. version. Mimeographed.]

The information is presented in the usual manner [cf. **38**, 273]. The position did not change materially in 1958, though new cases were recorded in regions previously thought to be free in Belgium, Denmark, Finland, Ireland, Romania, and the U.S.S.R. A very wet summer induced an exceptionally heavy incidence in Britain. In Federal Germany, var. Hassia was officially approved as resistant to several biotypes of the fungus [**38**, 764].

Pushkarev (I. I.). Результаты и перспективы селекции Картофеля на устойчивость к Фитофторе. [Results and prospects of Potato selection for resistance to *Phytophthora*.] Картофель [*Potato, Moscow*], **4**, 5, pp. 29–32, 1959.

In tests at the Belotserkva agric. Inst., U.S.S.R., with the Korenevskaya (very virulent) and Belorusskaya (mild) strains of *P. infestans* [**38**, 619] 1st generation hybrids of *S. demissum* with a commercial potato var. possessed 90–95% resistance to blight which decreased 2·5–3 times in the F_2. The most promising resistance to both strains resided in Seyanets and 728–44 from the Ĭygevski Selection Station.

Goossen (H.). **Importance of rain-resistant property of fungicides to the control of Phytophthora infestans de Bary.**—*Höfchenbr. BayerPflSch. Nachr.*, Engl. Ed., **11**, 2, pp. 70–80, 2 graphs, 1958.

The differences in the rain-resistant properties [**34**, 163] of 3 Cu oxychloride products

A, B, and C, tested for control of potato blight were established in laboratory and field tests at the Farbenfabriken Bayer A.G., Leverkusen, Germany. Glass plates sprayed with the products were immersed in water, and the degree of adhesion was determined. Then the resistance to simulated rain (5 mm., 5 min.) was tested. The quantity of Cu oxychloride used in the field tests was 2,250 g. Cu/ha.

In 1954, up to the time of the 1st check on 19 Aug., A (the most resistant to 'rain') gave the best control on the Bona var., whereas at the 2nd check (2 Sept.) though 66·7 mm. of rain fell between the 2 checks, A was well behind C, which in the preliminary tests had featured the weakest resistance to rain. In 1955 when crops of Vera were atomized at 400 l./ha. A again showed up best at the 1st check (1 Aug.) but, as before, B and C headed the results at the 2nd check (10 Aug.). The rainfall was 18·8 mm. 12 July–1 Aug., 34·8 mm. 1–10 Aug. Also in 1955 B and C were superior to A on crops of Ackersegen at both checks (15 and 25 Aug.): 39·8 mm. of rain fell between the 1st spray and 15 Aug. and 19·3 mm. between the checks. It is recommended that the rain resistance of fungicides effective against *P. infestans* should not be increased above a certain degree because transport of the active ingredient by rain and dew to low parts of the plants is essential to the success of a control operation. For good control of blight as much as possible of the active ingredient applied should be deposited on the crop, whereas even distribution is not so important as has previously been assumed.

Andrade (A. C.). **Emprêgo de fungicidas na cultura da Batatinha.** [Use of fungicides in Potato growing.]—*Biológica*, **25**, 7, pp. 134–145, 2 fig., 1959.

Directions are given for the chemical control of *Alternaria solani* and *Phytophthora infestans* in São Paulo, Brazil [**38**, 57], under the headings of factors contributing to success of the treatments, requisites of fungicides, methods of application, and leading fungicides for potato. Most of the compounds are well known; miltox which has interesting possibilities is a mixture of Cu oxychloride (37% metallic Cu) and 15% zineb, the former effective against *A. solani* and the latter against *P. infestans*. The present phytotoxicity of the product could probably be overcome by the inclusion in the formula of neutral and stabilizing substances.

Kranz (J.). **Über sortenbedingte Anfälligkeit der Kartoffelknolle für Fusarium caeruleum (Lib.) Sacc. und Phoma foveata Foister und ihre Beeinflussung durch den Anbauort.** [On the varietal susceptibility of the Potato tuber to *F. caeruleum* and *P. foveata* and the influence of the place of cultivation.]—*Phytopath. Z.*, **35**, 2, pp. 135–147, 8 fig., 1 graph, 1959. [Engl. summ.]

At the Institut für Pflanzenkrankheiten, Bonn Univ., 19 German potato vars. were tested for susceptibility to rotting by *F. caeruleum* [**35**, 122; **37**, 324] and *P. foveata* [**38**, 97]. After a spore suspension was injected into the base of 6 mm. deep holes the tubers were stored at high humidity at 16° C. for 28 days for the former fungus and 4° for 42 days for the latter in sterilized, closed boxes from 5 Nov. 1957, being aired daily. Early maincrop and maincrop vars. were attacked less severely than 1st and 2nd earlies (100% in Sieglinde for both spp., 100% in 12 vars. for *P. foveata*). Most vars. became susceptible to *P. foveata* later than to *F. caeruleum*. Resistance to *P.* in early Nov. seems to be located in the cortex, and this allows the development of 'hidden rots' not visible at the surface. The incubation period of *F.* rot remained constant at 16 days; that of *P.* decreased from 32 to 19 days. Tubers from sandy loam near Bonn were least attacked by *F. caeruleum*. Fenland soil increased resistance to *P.*

Loebenstein (G.). **Effect of a virus infection in Sweet Potatoes upon the host plant respiration.**—*Virology*, **9**, 1, pp. 62–71, 7 graphs, 1959.

At the agric. Res. Sta., Rehovot, Israel, the respiration rate of leaf disks from

var. 21 sweet potato infected by veinclearing virus was significantly higher than of healthy even 70 days after infection and even if infection was masked. The absolute respiration values were dependent on leaf age, time of daily measurement, preconditioning temp., etc. The same applied to roots and this may explain the severe yield reductions in sweet potatoes infected by the virus.

Venkata Ram (C. S.). **Report of the plant pathologist (1958–1959).**—*Rep. Tea sci. Dep. un. Pl. Ass. S. India, 1958–9*, pp. 22–26, 1959.

In addition to the usual tea root rot diseases which were common, this report [cf. **38**. 33] records that *Armillaria mellea*, rare in S. India, was the cause of 'root splitting' on a plant in the Madurai district; the only previous record was in 1934 in the Anamallais. *Acacia decurrens* in the Nilgiris was attacked by *Armillaria fuscipes* [cf. **34**. 451], a new record for S. India. Among 6 pathogens isolated from tea seedlings *Phomopsis* sp. was another new record for the region. Branch canker (*Macrophoma theicola*) [**37**. 78] and die-back of shoots (*Leptothyrium theae*) [cf. **31**, 211] on 1-yr.-old tea were commonly reported; the latter is not confined to tea in the 1st yr. from pruning, but may occur in the 2nd and even 3rd yr. after.

Grey blight (*Pestalotia theae*) [**29**. 57] caused considerable damage to young tea shoots, and in addition *Pestalotiopsis* sp. was isolated in 1 case. *Ciliospora gelatinosa*, isolated from diseased tea leaves, is a new record for India.

Venkata Ram (C. S.) & Jayaraman (V.). **The relation of interval between fungicide application on the control of blister blight disease of Tea plants.**—*Rep. Tea sci. Dep. un. Pl. Ass. S. India, 1958–1959*, pp. 36–41, 1 graph, 1959.

Spraying in Oct.–Dec. 1958 tea due for pruning in 1959 with perenox and blitox '50' at 6 oz. acre during the very severe outbreak of blister blight [*Exobasidium vexans*: **38**. 33] gave only low protection even at 7-day intervals; perenox at 10- and 14-days and blitox at 10-days gave similar results to weekly treatments.

Venkata Ram (C. S.). **The relation of interval between fungicide spraying on Tea leaves and subsequent washing by simulated rain to blister blight infection.**—*Rep. Tea sci. Dep. un. Pl. Ass. S. India, 1958–1959*, pp. 42–45, 1 graph, 1959.

A water spray equivalent to 0·1 in. rain in 30 sec. though somewhat reducing fungicidal efficiency against *Exobasidium vexans* [see above] when applied immediately after or within 2–3 min. of spraying with blitox '50' (4 oz./10 gal.) had little or no deleterious effect when applied 7–8 min. afterwards or later.

Siegel (A.). **Mutual exclusion of strains of Tobacco mosaic virus.**—*Virology*, **8**, 4, pp. 470–477, 2 graphs, 1959.

When leaves of *Nicotiana sylvestris* were inoculated at the Botany Dept, Univ. Calif., Los Angeles, with mixtures of strains U1 and U2 of tobacco mosaic virus [**37**. 311], lesion production by U2 was inhibited by the presence of U1. Data from a quantitative study of this phenomenon were consistent with the notion that only a single virus particle initiates and participates in a primary infection [cf. **36**, 136].

Hildebrandt (A. C.) & Riker (A. J.). **Viruses and single cell clones in plant tissue culture.**—*Fed. Proc.*, **17**, 4, pp. 986–993, 3 fig., 7 graphs, 1958. [26 ref.]

At the Dept Plant Path., Univ. Wis., Madison, tobacco tissue infected by tobacco mosaic virus grew for unlimited periods on a chemically defined medium. Virus activity/unit wt. tissue was measured by the number of local lesions produced on *Nicotiana tabacum* × *N. glutinosa*, and tissue growth was determined by wet wt. Incubated on basal media containing increasing levels (singly) of $NaNO_2$, NH_4Cl, $(NH_4)_2SO_4$, NH_4NO_3, NH_4 tartrate, NH_4 lactate, and NH_4 succinate, host growth compared favourably with the nitrate controls only with NH_4NO_3 and NH_4

succinate. Virus activity was greater than in the controls at high concs. of NH_4Cl, NH_4NO_3, or NH_4 succinate, and much greater with higher NH_4 tartrate.

Of various nucleic acids, purine, pyrimidines, and analogues tested, most compounds stimulated host growth; thymine and thiouracil both inhibited virus multiplication, whereas all the others did not influence or increased infectivity.

Variability in the heterogeneous mass of cells in the tissue was studied by growing clones from hand-picked single cells. Considerable variations were observed in those derived from established cultures of tobacco, *N. glutinosa*, and the above-mentioned hybrid in respect of growth rate, morphology, texture, colour, nutrient requirements, and amount of virus present after 4 successive monthly transfers of inoculated clones in virus-free liquid media.

Gierer (A.) & Mundry (K.-W.). **Production of mutants of Tobacco mosaic virus by chemical alteration of its ribonucleic acid in vitro.**—*Nature, Lond.*, **182**. 4647, pp. 1457–1458, 1 graph, 1958.

At the Max-Planck-Institut für Virusforschung, Tübingen, Germany, a strain of TMV producing mostly only chlorotic lesions on the tobacco var. Java, and also the active ribonucleic acid (RNA) fraction thereof [**35**, 551 : **37**, 597], were heated *in vitro* with nitrous acid and then examined for their ability to produce necrotic lesions on that host. The samples were treated for various times and diluted to a constant conc. for lesion assay on Java and Xanthi tobacco. Necrotic lesions on Java were assumed to result from mutated particles, and their number was expected to be nearly proportional to their conc.

A graph is presented of measurements under different conditions with TMV and RNA derived from 2 strains. From the results it was apparent that material treated with nitrous acid gave rise to a much larger number of necrotic lesions on Java than untreated; it was 20 times the spontaneous level when total infectivity had dropped to only half the original value. The whole virus treated with nitrous acid yielded the same proportion of mutants as RNA isolated after the treatment. Thus the mutants are produced by chemical reactions with RNA rather than by aggregation phenomena or changes in protein. A variety of other mutants was also produced by nitrous acid. To detect them the authors isolated individual lesions on Xanthi tobacco and assayed them on Java and Samsun. Of 60 lesions, 20 produced no infection, 33 led to a variety of altered symptoms, and only 7 gave rise to apparently unchanged symptoms on Samsun. The altered symptoms proved genetically stable in a transfer experiment.

Bawden (F. C.). **Effect of nitrous acid on Tobacco mosaic virus : mutation or selection?** —*Nature, Lond.*, **184**, 4688, pp. B.A. 27–B.A. 29, 1959.

After repeating at Rothamsted the work of Gierer & Mundry [see above; also a more detailed account in *Z. Vererbungslehre*, **89**, p. 614, 1958], the author confirms their findings but offers an alternative to the conclusion that mutations had been produced. As all bulk samples of TMV contain a mixture of strains the author examines the possibility that the results may be explicable in terms of selection from a mixed population of strains. Gierer & Mundry had excluded this possibility on the ground that the total number of lesions on Java increased, and not simply the ratio of lesions on Java to those on Xanthi, from which they conclude that the particles responsible for the lesions must have been increased by treatment with nitrous acid. This conclusion rests on the assumption that strains do not interact, but much evidence that conflicts with this is quoted. For example Sadasivan [**19**, 721] found that adding type TMV to inocula of necrotic lesion strains decreased the number of lesions produced. One such strain tested at Rothamsted was the tomato aucuba str., which when mixed in various amounts with TMV affected the number of necrotic lesions on Java and Judy's Pride: decreasing the amount of

TMV reproduced the phenomenon, attributed by Gierer & Mundry to nitrite-induced mutations, of decreasing the numbers of lesions on Xanthi and *N. glutinosa*, while those on Java and Judy's Pride increased. There are various possible explanations, which could be tested only by isolating the viruses present in different lesions and examining their behaviour on a range of plants. There is no doubt that strains able and unable to cause necrotic lesions in Java tobacco do interact and the interaction affects both the quantity and quality of the lesions produced. Though in the Rothamsted experiment aucuba mosaic str. caused fewer lesions on Java when mixed than when used alone, the mixtures sometimes produced more lesions, though no lesion was then of the aucuba type. The fact that interactions occur invalidates Gierer & Mundry's method of counting necrotic lesions produced by mixtures of strains to estimate the number of particles intrinsically capable of causing necrosis in Java. It is postulated that as the conc. of particles unable to cause necrosis decreases, so they interact less with those able to cause necrotic lesions. In addition, there is also an interaction between active virus and virus inactivated by treatment. That Gierer & Mundry's starting preparation did contain strains able to cause necrosis in Java is clear, and that these were interacting with other strains is strongly suggested by the fact that, after dilution to 1 10, the number of necrotic lesions on Xanthi fell to $\frac{1}{5}$, whereas the number on Java was only halved. Their isolations from single local lesions on Xanthi also indicate that their starting preparation was mixed.

It is concluded that before the effects described by Gierer & Mundry can be attributed to mutations it will be necessary not only to demonstrate that the end-products of the inactivating treatment differ in behaviour from the bulk of the starting material, but also that chemical changes produced *in vitro* are perpetuated in the progeny of the particles.

Wittmann (H. G.). **Darstellung und physikochemische Charakterisierung der Peptidketten des Tabakmosaik-virus.** [Demonstration and physico-chemical characterization of the peptide chains of Tobacco mosaic virus.] -*Experientia*, **15**, 5, pp. 174–175, 1 graph, 1959. [Engl. summ.]

At the Max-Planck-Institut für Biologie, Tübingen, highly purified virus was split by various methods, the ribonucleic acid removed, and the size of the protein subunit determined by sedimentation and diffusion. The mol. wt. of a polypeptide chain was estimated at 17,000–18,000 [cf. **39**, 43].

Schramm (G.) & Röttger (B.). **Untersuchungen über das Tabakmosaik-virus mit fluoreszierenden Antikörpern.** [Studies on the Tobacco mosaic virus with fluorescing antibodies.] -*Z. Naturf.*, **14***b*, 8, pp. 510–515, 10 fig., 1 graph, 1959.

At the Max-Planck-Institut für Virusforschung, Tübingen, the authors adapted the method of A. H. Coons *et al.* (*J. Immunol.*, **45**, p. 159, 1942; *J. exp. Med.*, **91**, p. 1, 1950) to the study of tobacco mosaic virus in Samsun tobacco plants [cf. **38**, 163]. By the 45th hr. virus protein was already discernible, originating in a zone surrounding the nucleus and subsequently diffusing through the entire cytoplasm. It could not be demonstrated in the nuclei or chloroplasts. The hypothesis that the virus is synthesized only in the cytoplasm was proved correct by the results of fractionation experiments on infected tissue, in which the virus antigen was detected by means of fluorescing antibodies primarily in the microsome fraction.

Hitier (H.) & Izard (C.). **Essais de lutte contre la mosaïque du Tabac par la chimiothérapie et par l'hybridation et la sélection génétique.** [Attempts at Tobacco mosaic control by chemotherapy and by hydridization and genetic selection.]—*Ann. Inst. exp. Tabac Bergerac*, **3**, 1, pp. 85–96, 1958. [Engl. summ. 17 ref.]

In field experiments during 1954 and 1955 terramycin, vitamin PP (nicotinamide),

maleic hydrazide, $MgSO_4$, $ZnSO_4$, $(NH_4)_2MoO_4$, $Co(NO_3)_2$, $Ba(NO_3)_2$, naphthylacetic acid, 2,4-D, propylthiouracil, and lutazol failed to control the virosis.

Resistant lines were derived from the hybrid *Nicotiana glutinosa* × *N. sylvestris* × *N. tabacum*, the sesquidiploid *N. tabacum* × *N. glutinosa*, and intervarietal hybrids, e.g. Paraguay × resistant Samsun and Paraguay × Cr. 60. However, the economic value of this mode of approach is limited by the diversity of viruses affecting tobacco cultivated in France, which necessitate the routine application of general sanitary measures [**28**, 87].

Protsenko (A. E.) & Smirnova (Mme V. A.). Влияние дефицита калия в растении на накопление вируса Табачной мозаики в листьях Табака. [The effect of potassium deficiency in plants on the accumulation of Tobacco mosaic virus in Tobacco leaves.]—Изв. Акад. Наук СССР. [*Izv. Akad. Nauk S.S.S.R.*], Ser. biol., *1959*, 4, pp. 590–594, 1959. [Engl. summ.]

At the microbiol. Inst., Soviet Acad. Sci., tobacco seedlings at the 5th or 8th leaf stage were transplanted to sand culture pots with a Pryanishnikov mineral salts mixture to assess the effect of K deficiency [cf. **34**, 110]. The plants were inoculated with TMV only when K and Mg deficiencies were evident (18 days after transplanting). Counts of lesions on *Nicotiana glutinosa* at the 6th, 11th, and 16th days after inoculation showed that the accumulation of TMV is inhibited in K deficient leaves. The addition of K salt solution (at 0·01 and 0·025 M) to the leaves increased the accumulation of the virus, though excess did not increase virus titre markedly. Mg deficiency did not affect the accumulation [cf. **39**, 41].

Cheo (C.-C.) & Mang (K.-J.). **Mosaic disease of Tobacco (Annual Report, 1957–1958).**—*Acta phytopath. sinica*, **4**, 2, pp. 113–119, 2 pl. (12 fig.), 1958. [Chin. Abs. from Engl. summ. Received Sept. 1959.]

Inoculation tests on tobacco and *Nicotiana glutinosa* at the Inst. appl. Mycol., Academica Sinica, Peking, using cigarette tobacco from 12 provinces, showed tobacco mosaic virus (TMV) to be widespread in China, mostly on late-planted crops. More than 120 collections of viruses from mosaic tobacco from Shantung and Honan provinces yielded different strains of TMV, cucumber mosaic virus, and a vein necrosis virus causing serious leaf rolling and stunting.

Aubert (O.). **Note préliminaire sur deux souches peu virulentes du virus de la nécrose des nervures du Tabac.** [Preliminary note on two mildly virulent strains of Tobacco veinal necrosis virus.]—*Phytopath. Z.*, **35**, 4, pp. 429–432, 1959.

At the Sta. féd. d'essais agric., Lausanne, an isolate of tobacco veinal necrosis virus (necrotic str. potato virus Y) [**37**, 420] from Italian Switzerland frequently gave rise to mild strains, which produced few or no necrotic lesions on tobacco leaves. A German isolate behaved similarly. These strains are closely related to the parent strain, as demonstrated by cross protection tests, though their symptoms are similar to those of 'ordinary' strains of potato virus Y.

Matthews (E. M.), Kroontje (Wybe), & Henderson (R. G.). **Effect of length of rotation on losses from black shank in flue-cured Tobacco varieties.**—*Agron. J.*, **51**, 9, pp. 513–514, 1959.

In a test started in 1951 by the Depts Agron. and Plant Path. and Physiol., Va agric. Exp. Sta., Blacksburg, 5 flue-cured tobacco vars. were grown in rotations in plots at Chatham naturally infested with *Phytophthora parasitica* var. *nicotianae* [**39**, 45]. In the 1-yr. rotation (rye cover crop) losses averaged 14·3% plants killed in 1955 and 33·2% in 1956, whereas in a 3-yr. rotation (maize, wheat, and red top [*Festuca*] with rye and crimson clover cover) the figures were 17·8% in 1955, 1·2%

in 1956, and 0·5% in 1957. Thus the pathogen was not eliminated by a 3-yr. rotation nor by a 4-yr. fallow period between the time tobacco was last planted and the beginning of the experiment. Even with 3-yr. rotation heavy losses in infested soil must be expected in some seasons, therefore the growing of a susceptible var., even in such a rotation, is a very questionable practice.

Rossouw (D. J.). **Die invloed van temperatuur en humiditeit op die poeieragtige meeldouswam van Tabak.** [The effect of temperature and humidity on the Tobacco powdery mildew fungus.]—*S. Afr. J. agric. Sci.*, **2**, 1, pp. 19–31, 2 graphs, 1959. [Engl., Fr. summ.]

At the Sentrale Tabaknavorsingstasie, Rustenburg, the min., opt., and max. temp. for germination of conidia of *Erysiphe cichoracearum* [cf. **20**, 90] and for the infection of tobacco were < 5, 24–25, and 30–35° C., and 5, 23·5, and 25°, respectively. The occurrence of the disease was correlated with the av. daily max.-min. temp. of the area, and did not occur with a daily av. of 25° or more. Between 15 and 30° germination occurred at R.H. from 0 to 100% and no correlation could be found between R.H. and the occurrence of the disease.

Rushizky (G. W.) & Knight (C. A.). **Ribonuclease-sensitive infectious units from Tomato bushy stunt virus.**—*Virology*, **8**, 4, pp. 448–455, 1959.

Mixing tomato bushy stunt virus with sodium dodecyl sulphate at pH 4·1 and room temp., and subsequent removal of protein by water-saturated phenol, yielded infectious preparations which, in the few tests made at the Dept of Biochem. and the Virus Lab., Univ. Calif., Berkeley, resembled ribonucleic acid (RNA). Their infectivity, about 0·1% of that of intact virus containing an equivalent amount of RNA, was destroyed by pancreatic ribonuclease under conditions which only slightly reduced the infectivity of whole virus. This is the 2nd report of the isolation of infectious RNA from a highly purified sample of a spherical virus.

Alexander (L. J.). **Progress report of national screening committee for disease resistance in the Tomato for 1954–1957.**—*Plant Dis. Reptr*, **43**, 1, pp. 55–56, 1959.

This is a preliminary report summarizing the results of tests on two further lots of 150 accessions each [**36**, 622] carried out by 29 co-operators in 11 States of U.S.A. and Canada and other countries.

No immunity from *Alternaria solani* was detected but resistance to the early blight and collar rot phases, taken separately, appears to exist in a few accessions. In 1953 and 1954 Nos. 92863, 128244, and 171708 were highly resistant to *Colletotrichum phomoides*, and in 1955 and 1956 there were 9 resistant lines. Resistance to race 6 of *Cladosporium fulvum* was high in *Lycopersicon peruvianum* (126928, 212407) and *L. pimpinellifolium* (211840).

Tests in Jersey, Channel Is., showed that two lines of *L. glandulosum* (126448, 199380) were resistant to *Didymella lycopersici*.

Highest resistance to race 1 of *Fusarium oxysporum* f. [*bulbigenum* var.] *lycopersici* was in 205033; others highly resistant were 205012 (*L. pimpinellifolium*), 204987, 205026, 115201, and 126913 in 1952–3 and *L. peruvianum* 126928 and *L. pimpinellifolium* 211838, 211839, and 212408 in 1955–7; to race 2, 205010 was resistant in 1952–3 and *L. peruvianum* 126928 and 212407 and *L. pimpinellifolium* 211840, 212408, and 212409 in 1955–7.

The high resistance of 115201 to *Phoma destructiva* was confirmed but it is difficult to handle in breeding. Most of the accessions of *L. pimpinellifolium* and suspected hybrids with it were resistant to *Phytophthora infestans* tomato race 0; 205016, and 205017 were resistant to race 1, and 204996 to both races.

Reaction to *Septoria lycopersici* was only at an intermediate level though some

accessions appeared to be segregating for resistance. *L. peruvianum* and *L. pimpinellifolium* appear to have the highest type of resistance (grade 1–2) to *Stemphylium solani*.

Tomato var. 128887 was highly resistant to both mild and severe strains of potato virus Y; 25 plants of this line and 26 of 117897 remained healthy after re-inoculation 4 times. Resistance to tobacco etch virus was found in 166989 (symptomless after 2 inoculations) and 183692. *L. peruvianum* 126928 and 212407 showed positive resistance to the green and yellow strains of tobacco mosaic virus.

No resistance to *Verticillium alboatrum* was found.

Tsedova (Mme A. N.). Заболевание коры древесных пород при массовом озеленении. [Tree bark diseases in large-scale plantings.]—Бюлл. главн. бот. сада [*Bull. cent. bot. Gdn, Moscow*], *1959*, 35, pp. 95–101, 8 fig., 1959.

In studies undertaken at the bot. Garden, M.V. Lomonosov Moscow State Univ., to diagnose infection in trees in the University plantations on the Lenin hills, *Diaporthe scaba* and *Cytospora* [*Valsa*] *intermedia* [**36**, 435, 559] were determined on oak, *C.* [*V.*] *nivea* and *C. chrysosperma* [*V. sordida*] on poplar, *Euvalsa acclinis*, the perfect state of *C. capitata*, on apple tree vars., *Melanconium betulinum* and *Libertella betulina* on birches, and *Libertella* sp. on *Quercus rubra*. The fungus flora on the bark of diseased trees in the park and gardens was identical with that on dry branches of similar trees in natural conditions. Adequate attention in the immediate period after planting is a basic prophylactic measure. Additional measures recommended include coating transplanted trees with milk of lime with the addition of Cu sulphate in the early rooting period, and 2 applications (10–15 day interval) of Cu naphthenate to the surface of the infected areas.

Silverborg (S. B.). **Rate of decay in northern hardwoods following artificial inoculation with some common heartrot fungi.**—*For. Sci.*, **5**, 3, pp. 223–228, 4 fig., 1959.

During this 5-yr. study at the State Univ. Coll. of Forestry, Newcomb, N.Y. [cf. **35**, 134] inoculum was prepared by a method similar to that of Darley *et al.* [**22**, 380] and used on trees in Huntington Forest. The fungi which caused the greatest amount of vertical decay (expressed in ft./5 yr.) were *Fomes igniarius* [**28**, 552] in *Populus grandidentata* 9·5, and in beech 4·8, *F. applanatus* [*Ganoderma applanatum*] in beech 5·6, and *Polyporus glomeratus* in *Acer saccharum* 2·8. Limited decay was produced by *F. igniarius* in *A. saccharum*, *Poria obliqua* in yellow birch (*Betula alleghaniensis*), and *Polyporus glomeratus* in American beech (*Fagus grandifolia*). *Fomes igniarius* and *G. applanatum* formed cankers on American beech 3 yr. after inoculation; abortive sporophores of *F. igniarius* first appeared on *Populus grandidentata* and American beech 4 yr. after inoculation, at which time decay in the former was extensive but in the latter limited; a single layer of tubes was formed the following year.

Caroselli (N. E.). **The relation of sapwood moisture content to the incidence of Maple wilt caused by Verticillium albo-atrum.**—*Phytopathology*, **49**, 8, pp. 496–498, 1 fig., 1 graph, 1959.

In studies at the Univ. Rhode Island, Kingston, 20 Norway maple trees [*Acer platanoides*], about 10 ft. high, were selected in June 1957, divided into 2 groups, and half of each group wound inoculated in the sapwood with *V. alboatrum* [cf. **34**, 496; **36**, 739]. Each tree in one group received a supplementary water-supply connected with a radial boring and 2 smaller tangential ones in the sapwood. The average sapwood moisture content during 1 July–12 Aug. was 52·2% in the group with added water and 37% in the other, and the average wilt on 12 Aug. was 12 and 34%, respectively, with a similar reduction in sapwood discoloration.

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